Technology Mapping for Supply Chain from Patents using Discriminant Functions

A Thesis Submitted in Partial Fulfilment of the Requirements for the Degree of

Master of Technology

by

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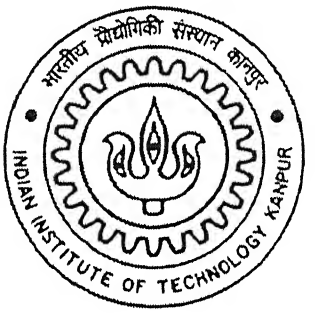

to the

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CERTIFICATE

It is certified that the work contained in this thesis entitled **"Technology Mapping of Supply Chain from Patents Using Discriminant Functions"** has been carried out by **Mr. Rajnish Kumar Singh (Roll No. Y3114013)** under my supervision and the work has not been submitted elsewhere for a degree.

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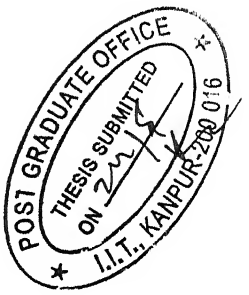

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ABSTRACT

Technology mapping is an effective appraiser for any technology. It assists in research and development of the firm by providing information for decision maker in regards of technical progress and current market trends. Patent documents are one of major source of technical and commercial knowledge. They are also valuable source to be used in technology mapping for measuring technology changes, trends and classifications of technology in various domains.

We propose an interactive methodology (semi-automated) for classification. Our methodology consists of using attributes like Assignee and Author name, I-Class and U-class number, Citation along with keywords and keyword-pair. We built an discriminant functions based on these attributes for classification. To demonstrate this methodology we have selected technology case of Supply Chain Management. Supply Chain Management is a very broad field and consists of many sub-technology domains. The complete classification of the patent documents in the field of supply chain management up to level 3 has been done using the proposed method.

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CHAPTER 1

INTRODUCTION

Data Mining or Knowledge Discovery in Databases (KDD) as it is also known, is the nontrivial extraction of implicit, previously unknown, and potentially useful information from data. This encompasses a number of different technical approaches, such as clustering, data summarization, learning classification rules, finding dependency net works, analysing changes, and detecting anomalies.

1.1 Patents and Technology Mapping (Verbeek A., et al., 2002)

The relationship between science and technology and its role in economics development has received widespread attention. Publication and patents provides the primary 'raw material' for building and development system. Bibliometric information, i.e. scientific publication, patents and citations to these publication and patents, constitutes and adequate information source for the mapping of field and sub field of scientific and technological enquiry as well as a mean of assessing the performance of the major actors in those fields and sub fields. Scientific publications and patents constitute a generally accepted, though not always perfect, output indicator of scientific and technological activity. New ideas, on the one hand, and new R&D professionals, on the other hand, are the two major outputs of academic science. The latter are relatively easy to measure, whereas the output of new ideas is more difficult to grasp in objective, and preferably quantitative, way. The best measure that exist at the moment, consist of using scientific publications and patents and citations to these publication provides a measure of scientific productivity, while the number of patents produced by a particular organization, country or region provide a first order indicators of its technological vitality. The area of research utilizing the information contained in research publications to obtain a better view on an actor's scientific output is labeled 'bibliometrics'.

The analysis of patent information is considered to be one of the most established, directly and history reliable methods of quantifying the output of a technology system (Soete and Wyatt, 1983). There use occurs more often in technology mapping compared to other innovation indicator. A patent hence is a 'property right' on an 'official sealed' claim (Grupp, 1998).

1.2 Supply chain management

For the purpose of classification we have chosen Supply chain Management. It is very board field and it consists of many sub technologies. To study supply chain management and its sub technology domain Books, journals and Patents need to be referred. Patents are a rich source of information about technologies. IBM, i2 Technologies and Accenture LLP etc are the major players in this field and they have many patents in supply chain and related technology.

1.3 Problem Identification

Mirdha, Bhuvanesh (2004), used K-Nearest Neighbor (k-NN) algorithm method for classification of the patents in subclasses. This thesis is further to extend the methodology by developing discriminant function approach as classification tool.

1.3.1 Methodology

In this thesis we have used other indices like author name, assignee name, citation, key word, keyword-pairs, I-class, U-class as indicator for classification. These are associated with every patent that is present in USPTO and EPO. These indices are called metadata. We will use these indices to develop classification method for patents with objective of maximizing precision and accuracy.

1.4 Organisation of Thesis

Technology Mapping is an important part of Research and development. It provides information about current market trend and about technical progress in specific technology area.

This thesis is organized as follows: Chapter 2 discusses the theoretical and research work that have been done in technology mapping, text mining area and the work done in field of document classification. Chapter 3 discusses the major issues and broad classification of supply chain management. Chapter 4 discusses step-by-step methodology followed for application of technology mapping using discriminant function approach. Chapter 5 discusses results obtained using discriminant function and in chapter 6 conclusion and future scope of the proposed work are discussed.

CHAPTER 2

LITERATURE REVIEW

No other innovation indicator can be traced back over comparatively long periods of time, may at the same time be disaggregated at a very low level allocable to individual economic units, and is also precise and accurate insofar as identification of the timing of the innovation event is concerned (Grupp, 1998).

2.1 Patents

A patent is a document, issued by an authorized governmental agency, granting the right to exclude anyone else from the production or use of a specific new device, apparatus, or process for a stated number of years. The grant is issued to the inventor of this device or process after an examination that focuses on both the novelty of the claimed item and its potential utility. The right embedded in the patent can be assigned by the inventor to somebody else, usually to his employer, a corporation and/or sold to or licensed for use by somebody else. Only the potential threat of or an actual suit in the courts for infringement damages can enforce this right (Griliches, 1990).

For the claim to be recognized by other competing companies, all property right details have to be made public. The purpose of the patenting system is the protection of the inventor. Without property rights, technological knowledge would be public property (i.e. the public good character of knowledge) and competitors would be able to imitate inventions without penalty and claim any piece of new knowledge to be their own. The inventor is granted a temporary monopoly situation and, as a consequence, he is assured of the benefits by patent right that may derive from his innovative efforts. Via monopoly granted by the patent system, the incentive to innovate is deemed to be enticing enough for private inventors so that a sufficient number of innovative 'efforts' are made, which in turn favour technological advance and economic growth (Verbeek, A., et al., 2002).

2.2 Patent Document – Closer Look

Generally a patent document has the following information. (Annexure A to USPTO, Annexure B to EPO)

Patent Document

- **TITLE PAGE WITH BIBLIOGRAPHIC INFORMATION**
- **TEXT**

  DESCRIPTION OF THE INVENTION

  PREFERRED EXAMPLE IN DETAIL

  DRAWINGS/DIAGRAMS/FLOW SHEETS

- **CLAIM**

2.2.1 Title Page

The title page containing bibliographic information is well indexed in most international databases dealing with patent documentation (e.g. Derwent). A quick glance at the title page indicates all the bibliographic details contained in it. This bibliographic information is summarized as follows:

TYPICAL BIBLIOGRAPHIC INFORMATION

- **COUNTRY OF PUBLICATION**
- **NATIONAL PATENT CLASSIFICATION**
- **INT. PAT. CLASSIFICATION**
- **TITLE**
- **ABSTRACT**
- **INVESTOR**

- **APPLICATION**
- **APPLICATION NO.**
- **SERIAL NO. OF PATENT**
- **DATE OF APLLICATION**
- **PRIORITY DATE**
- **PRIORITY COUNTRY**
- **REFRENCE CITED BY EXAMINER**

2.2.2 Text

The various elements constituting the text of the patent document are illustrated below.

TEXT

- **OBJECT OF INVENTION**
- **PRIOR ART**
- **EXAMPLES WITH SUPPORTING DATA OR OTHER SPECEFIC EMBODIMENTS (APPARATUS, FIGURE, ETC.)**
- **DISCLOSE/DESCRIBE INVENTION ALSO INCLUDE DIAGRAMS/FORMULAE, IF NECESSARY**
- **CLAIMS DEFINING THE MONOPOLY CLAIMED (THIS HELPS IN FINDING WHAT CONSTITUTES INFRINGEMENT)**

The "**object of the invention**" clearly defines the essential feature of the invention. The section on "**Prior art**" surveys the literature from both open literature and previous patent documents. After a brief description of various aspect of the invention, the specific embodiments, e.g. of various specific constructions or apparatus or chemical examples with supporting data, illustrating all aspect of an invention, follow. The "**Claim**" defining monopoly claimed is of great significance as these help in not only understanding all the features of the invention that are protected but also helps in finding what constitutes infringements. Drawings, circuit diagrams, Flow sheets, formulae, etc. are also used to quantify or even demonstrate the

invention. It will be clear that patent documents cover all aspects of an invention for which one seeks protection. Therefore, an appropriate study of this document can be a very important source of information and knowledge. It should be appreciated that a patent document is not necessarily (most often not) equivalent to 'technology know-how', however it is expected to carry relevant information so that a person well versed in the art of the subject can reproduce the invention (Ganguli, P. and Blackman, M., 1995).

2.3 Patent and its role in innovation

According to Grupp (1998), a patent has a number of specific properties or functions. First, a patent grants the owner the exclusive right of exploitation of a precisely defined technical advancement for a specific period of time. Three conditions need to be fulfilled for this grant to be made: novelty, inventive step and the possibility of commercial application. Secondly, the innovation-stimulating function of the patent system is supplemented by its information-dissemination function, which is achieved by the publication of the patent. The information function thus is a second qualitative property of patents. Patents can thus be used by technologists other than the inventors with the purpose of obtaining insight into the progress of technological knowledge. From an economic point of view, patents therefore have the advantage that the information contained in the patent is made publicly accessible, thus fostering the diffusion of technological innovations. The patent system fulfils an important role in the information diffusion in the sense that it avoids needless duplication of R&D efforts, which in turn is believed to accelerate technological progress. In return for obtaining a temporary monopoly, the inventor indeed has to make his invention public so that other inventors can contribute to yet further advances in the state-of-the-art in a particular field of technology. A third function relates to the output function created by patent documents. Successful R&D activity is usually followed by a patent providing detailed information (e.g. date, time, circumstances, location etc.) on the activity itself. This property can be used for the measurement of innovations. In relation to the property versus information functions of a patent, it has been debated to what extent the patent system also enhances social welfare. The system stimulates innovations and technological competition, but simultaneously it grants monopoly rights in order to keep the incentives for private

inventors as high as possible. This might disturb regular competition, albeit temporarily. Economists like to point to the fundamental dilemma between appropriation and diffusion of knowledge to foster economic progress (Arrow, 1994). The economic literature suggests various instruments that can be used by policy-makers to deal with this dilemma. In particular, both the length, i.e. the duration in time, and the width, i.e. the range of claims made and granted in the patent document, of the patent protection are shown to be instrumental in influencing the contribution of the patent system to the genesis of social welfare (Granstrand, 1999).

The relationship between patents, as a measure of innovative output, and R&D, as a measure of innovative input, has been investigated repeatedly. The results of these studies indicate a strong and statistically significant relationship between R&D expenditures and patent counts in the cross-sectional dimension, i.e. across firms and industries. Pakes and Griliches (1984), for example, found that firms that spend more on R&D possess more patents. In the within-firm time-series dimension, a statistically significant relationship between R&D and patent counts is found too, but this relationship has appeared to be weaker. In a recent study, Arundel and Kabla (1998) showed that large R&D intensive firms do not patent a higher percentage of their innovations than firms with low R&D intensities.

2.4 **Filing a patent application** (Verbeek, A., et al 2002)

An inventor (individual, agency or company) wishing to protect an invention in a particular country files an application with that country's patent office. In the application, one or more claims will be made, showing those aspects in which the product or process has to be considered inventive. During the examination procedure, these claims will be subject to further assessment and comparison with the technological frontier, the so-called prior art examination. It is possible to obtain protection in a (large) number of countries at the same time. Up to one year after the 'priority year', the applicant can file for a patent in any desired country, at the European Patent Office (EPO) for simultaneous protection in more than one country, or at the World Intellectual Property Organization (WIPO) for an even broader protection. At present, the national systems in EU countries and the EPO system work in parallel, although for many years a Community Patent has been advocated in order

to reduce the inefficiencies and the costs associated with the current EPO procedures (patent applications now have to be translated into the various languages of the member countries in which they are applied for, making the procedure expensive and elaborate). At present, the political debate on the Community Patent has not yet been closed, although the economic arguments in its favour are obvious. An important way in which patent systems differ concerns their publishing and granting procedures. Until recently, a USPTO filing tended only to be published after the patent had been granted. These grants do not follow a strict timetable and can in many cases take up to five years (OECD 1994a, b). In the EPO system (and nowadays also in the USPTO system), a patent is disclosed 18 months after priority application, regardless of whether it has been granted or not. Given the historic problem of having to deal with different lead times between filing and publication, priority year dates have been more appropriate when making year-to-year comparisons between USPTO and EPO statistics than, for instance, the publication dates or the dates of the patent grant. Priority year dates are of course older than the publication dates. Differences in patenting procedures stem mainly from a different emphasis in patent philosophy. In the USPTO system, patent protection is focused on the protection of the rights of the inventor. The EPO system aims first of all at the timely diffusion of new technological information in order to stimulate the rate of technological progress.

2.5 Indian patent law and literature (Biju, A. and Moitra S., 2001)

Indian industry has had to face two particularly daunting challenges in the 1990s. A protected market has given way to a liberalized environment, where it faces competition from imported products. Indian industry has also had to cope with rapid technological developments and innovation occurring in both product and process technologies.

To come up with new products and processes, Indian industry needs to have access to detailed information on technological innovations that it has to compete with. While a search of patent literature and innovation surveys carried out in a competitor's parent country could give some idea of innovations taking place there, such information could be misleading because the competitor need not introduce that product in the Indian market.

A more reliable method of assessing competition could be an analysis of Indian patent data. Since competitors would normally apply for an Indian patent only if they intend to exploit an innovation in the Indian market, an analysis of Indian patent data could provide firms with information that could help in their strategic planning efforts.

2.5.1 Indian patent office literature

The patent law of 1970 restricted the fields of patentability, only grants process and not product patent in food, pharmaceutical and chemical fields, restricts the term of patents and has an elaborate system of licenses to ensure that patents are worked in India. After the globalization of the economies and increasing role of WTO norms, it became imperative for the countries to oblige these norms. One of the agreements relating to the patent policy was TRIPs (Trade Related Intellectual Property Rights).

Salient features of the Patents (Amendment) Ordinance, 2004 (source: www. indianembassy.org /Economy)

a) Extension of product patent protection to all fields of technology (i.e., drugs, food and chemicals);

b) Deletion of the provisions relating to Exclusive Marketing Rights (EMRs) (which would now become redundant), and introduction of a transitional provision for safeguarding EMRs already granted;

c) Introduction of a provision for enabling grant of compulsory license for export of medicines to countries which have insufficient or no manufacturing capacity, to meet emergent public health situations (in accordance with the Doha Declaration on TRIPS and Public Health);

d) Modification in the provisions relating to opposition procedures with a view to streamlining the system by having both Pre-grant and Post-grant opposition in the Patent Office;

e) Addition of a new proviso in respect of mailbox applications so that patent rights in respect of the mailbox shall be available only from the date of grant of patent, and not retrospectively from the date of publication.

f) Strengthening the provisions relating to national security to guard against patenting abroad of dual use technologies;

g) Clarification of the provisions relating to patenting of software related inventions when they have technical application to industry or are in combination with hardware;

h) Rationalization of provisions relating to time-lines with a view to introducing flexibility and reducing the processing time for patent applications, and simplifying and rationalizing procedures.

2.6 Patent Indicators (Verbeek, A., et al., 2002)

As mentioned, if one wants to address questions about the technological sources of economic growth, the rate of technological change or the innovation capabilities of different firms and countries or regions, almost no good measures are available. As a consequence, we are reduced either to pure speculation or to the use of various, rather distantly related, 'residual' measures and proxies.

2.6.1 Advantages of Patent Indicators as Measures of Technological Activity

The various advantages of patent indicators as measurement of technological activity are as follows:

- The proximity of patents to the output of industrial R&D and other inventive and innovative activities implies that there is no other or better equivalent for this measurement purpose.

- Patents cover virtually every field of technology useful for the analysis of the diffusion of key technologies (except software, which is generally protected by copyright and can be patented only when it is integrated as a 'technical function' in a process of product).
- Patent data offer a world-wide geographical coverage.
- The very detailed classification schemes in patent documents which allow for almost unlimited choice of aggregation levels from broad fields to single products.
- Patent documents include many details of interest, such as year of invention, technical classification, assignee, inventor etc.
- The statistical processing of the data is largely free of errors, because patent documents are legal documents in which the details are recorded carefully and systematically.
- Accessibility, easy and large-scale electronic availability of patent data (EPO/USPTO data on CD-ROM or tape, DERWENT, Dialog, Datastar, Delphion etc.).

2.6.2 Limitations of Patent Indicators as Measures of Technological Activity

The limitations of patent indicators as measure of technological activity are listed below:

- Firms differ in their propensities (number of patents per unit of expenditure on R&D or just number of patent applications) to patent.
- Technology fields differ in their propensity to patent.
- Countries differ in their propensity to patent: size and geographical position give rise different expectations on the returns from patent protection (combination with other input or output indicators are necessary).
- Differences among the various (national) patent systems, arising from legal, geographical, economic and cultural factors (e.g. the issue of the 'home advantage') have to be taken into account when using patents as indicators of technological progress.

In spite of all the difficulties, patent statistics remain a unique resource for the analysis of the process of technical change. Nothing else even comes close in the quantity of available data, accessibility, and the potential industrial, organizational, and technological detail (Griliches 1990).

2.7 Patent resources

Many of the organizations are working in Intellectual property rights and patents area worldwide, some of them are international organizations and many are country wise patent offices which provides information and documents.

a. **World Trade Organization (WTO)** http://www.wto.org
b. **World Intellectual Property Organization (WIPO)** http://www.wipo.int
http://www.ompi.int
c. **INPADOC** http://www.cas.org, http://pk2id.delhi.nc.in
d. **European Patent Office (EPO)** http://www.european-patentoffice.org
e. **European Union - Office of Harmonisation of Internal Markets (OHIM)**
http://www.oami.eu.int
f. **Singaporean patent office** http://www.ipos.gov.sg, http://www.surfip.gov.sg
g. **Canadian intellectual property office** http://patents1.ic.gc.ca
h. **Japanese patent office IPDL** http://www.jpo.go.jp
i. **US patent and trademark office (USPTO)** http://www.uspto.gov
j. **Indian patent office** http://www.patentoffice.nic.in
k. **Chinese patent office** http://www.sipo.gov.cn
l. **Australian patent office** http://www.ipaustralia.gov.au

m. German patent office	http://www.dpma.de
n. Hungarian patent office	http://www.hpo.hu
o. Portuguese patent and trademark office	http://www.inpi.pt
p. Korean intellectual property office (KIPO)	http://www.kipo.go.kr
q. The UK patent office	http://www.patent.gov.uk

2.8 Patent analysis: a survey of literature

Analysis of patent data has long been considered to be an important method of assessing various aspects of technological change. Most studies have used patent statistics as a tool for either studying the relationship between technological development and economic growth (Penrose, 1951, Taylor and Silberston, 1973), or to assess the research and innovation process in a national and international context (Bosworth, 1984, Schiffel and Kitti, 1978, Paci and Sassu, 1997). Some studies, however, have analyzed it from the perspective of company policy for assessing the level of technology development in a particular sector, taking patent statistics as a technology indicator (Archibugi and Pianta, 1996; Ashton and Ashton; Basberg, 1987; Mogee, 1991; Liu and Shyu, 1997).

Patent analysis has also served as a basis for analyzing a firm's policy with regard to research, development (Liu and Shyu, 1997), estimation of technological strengths and weaknesses of competitors (Narin and Noma, 1987), and exploitation of foreign markets (Shipman, 1967). Patenting activity in a foreign country is usually undertaken with the objective of protecting a potential market in that country for a firm's products. Since patenting abroad can be a prolonged and expensive process, it seems reasonable to assume that a company patents abroad only when it is confident that a relatively large market exists for its products in the country where it patents. It has been recognized that the patenting activity by foreign firms in a country is closely related to the technological level and patenting system in force in the country (Bosworth, 1984).

Findings derived from the use of patents as a proxy of inventive and innovative activity were used to analyze the interdependence between industrial sectors and technology fields in Austria (Gassler, 1996). Patterns of innovative activities at the technological and country levels using patents data have also been examined, and it was found that while these patterns differ systematically across technological classes, they are very similar across countries (Malerba and Orsenigo, 1996). As an alternative to patent counts, patent claims data have been explored and claims were found to be a better indicator of national technological capacity (Tong and Frame, 1994). Finally, the issue of the private value of patents has been estimated over time and across technologies by using stochastic models (Lanjouw, 1998; Fikkert and Luthria, 1998). The basic finding is that innovations become obsolete fairly rapidly (within about 10 years of the application date).

Since patenting data provide information on both the technology levels in a particular sector and the commercial intentions of potential competitors, they have the potential to serve as a useful input into corporate strategic planning.

2.9 Information Retrieval (Weng, 2003)

Faster the Internet and information technologies are developed, information exchanges become quicker and the larger amount of information is exchanged. However, it leads to a problem regarding information overflow, which has become serious threat for retrieval and classification. This result more time and money being spend on information to find required kind of information. Often people repeat processes that they have already performed, such as filtering documents to retrieves similar information at different times.

In the knowledge discovery area, data mining techniques are dedicated to Information Retrieval (IR) of structured databases. On the other hand, text-mining techniques are also dedicated to IR of unstructured or semi-structured textual data. Text mining can also be seen as a combination of techniques that include all

techniques applied in solving the problems about information overflow in documents (Weng, 2003).

2.9.1 **Data mining** (Osmar R. Zaiane, 1999)

We are in an age often referred to as the information age. In this information age, because we believe that information leads to power and success, and thanks to sophisticated technologies such as computers, satellites, etc., we have been collecting tremendous amounts of information. Initially, with the advent of computers and means for mass digital storage, we started collecting and storing all sorts of data, counting on the power of computers to help sort through this amalgam of information. Unfortunately, these massive collections of data stored on disparate structures very rapidly became overwhelming. This initial chaos has led to the creation of structured databases and database management systems (DBMS). The efficient database management systems have been very important assets for management of a large corpus of data and especially for effective and efficient retrieval of particular information from a large collection whenever needed. The proliferation of database management systems has also contributed to recent massive gathering of all sorts of information. Today, we have far more information than we can handle: from business transactions and scientific data, to satellite pictures, text reports and military intelligence. Information retrieval is simply not enough anymore for decision-making. Confronted with huge collections of data, we have now created new needs to help us make better managerial choices. These needs are automatic summarization of data, extraction of the "essence" of information stored, and the discovery of patterns in raw data.

With the enormous amount of data stored in files, databases, and other repositories, it is increasingly important, if not necessary, to develop powerful means for analysis and perhaps interpretation of such data and for the extraction of interesting knowledge that could help in decision-making.

Data Mining, also popularly known as *Knowledge Discovery in Databases* (KDD), refers to the nontrivial extraction of implicit, previously unknown and potentially useful information from data in databases. While data mining and knowledge discovery in databases (or KDD) are frequently treated as synonyms, data

mining is actually part of the knowledge discovery process. The following figure (Figure 2.1) shows data mining as a step in an iterative knowledge discovery process.

2.9.2 Steps involve in data mining (Osmar R. Zaiane, 1999)

The Knowledge Discovery in Databases process comprises of a few steps leading from raw data collections to some form of new knowledge. The iterative process consists of the following steps:

- **Data cleaning**: also known as data cleansing, it is a phase in which noise data and irrelevant data are removed from the collection.
- **Data integration**: at this stage, multiple data sources, often heterogeneous, may be combined in a common source.
- **Data selection**: at this step, the data relevant to the analysis is decided on and retrieved from the data collection.
- **Data transformation**: also known as data consolidation, it is a phase in which the selected data is transformed into forms appropriate for the mining procedure.
- **Data mining**: it is the crucial step in which clever techniques are applied to extract patterns potentially useful.
- **Pattern evaluation**: in this step, strictly interesting patterns representing knowledge are identified based on given measures.
- **Knowledge representation**: is the final phase in which the discovered knowledge is visually represented to the user. This essential step uses visualization techniques to help users understand and interpret the data mining results.

2.10 Information retrieval techniques

When a patent application is considered or submitted, the search for previous inventions in the field--known as prior art--relies crucially on accurate patent classification. The retrieval of patent documents is crucial to patent-issuing authorities, potential inventors, research and development units, and others concerned with the application or development of technology. The number of patent applications is currently rising rapidly worldwide, creating the need for an automated

categorization system (Smith, 2002; Hull et al, 2001; Calvert & Makarov, 2001). In industry, patents are a major source for gathering intelligence about competitors' activities, but this source necessitates sophisticated tools for meaningful data mining (Vachon, 2001).

2.10.1 Document categorization

Traditionally, document categorization has been performed manually. However, as the number of documents explosively increased, the task became no longer amenable to the manual categorization, requiring a vast amount of time and cost. This has lead to numerous researches for automatic document classification. A text classifier assigns a document to appropriate categories, also called topic, in a predefined set of categories. Originally, research in text categorization addressed the binary problem, where a document is either relevant or not w.r.t. a given category. In real-world situation, however, the great variety of different sources and hence categories usually poses multi-class classification problem, where a document belongs to exactly one category selected from a predefined set. Even more general is the case of multi-label problem, where a document can be classified into more than one category. While binary and multi class problems were investigated extensively, multilevel problems have received much less attention. As the number of topics becomes larger, multi-class categorizers face the problem of complexity that may incur rapid increase of time and storage, and compromise the perspicuity of categorized subject domain. A common way to manage complexity is using a hierarchy. Internet directories and large online databases are often organized as hierarchies (Tikk, D. and Biro, G., 2003)

Classifications are hierarchically organized collections of classes and subclasses that attempt to classify all subject matter. At the top of the hierarchy, classes represent very general subject matter. These general classes subdivide into more specific classes or subclasses. A class that subdivides into a subclass is a parent class while the subclass is defined as a child class. Subclasses having the same parent class are sibling subclasses. Subject matter can be classified in any class including a parent and child class of any hierarchical level (Legakis, L., et al., 1993).

Patent databases are typically such where the use of a hierarchical category system is a necessity. Patents cover a very wide area of topics, and each field can be further divided into subtopics, until a reasonable level of specialization is reached. (The hierarchy of topics is often called taxonomy.) The International Patent Classification (IPC) is a standard taxonomy developed and administered by WIPO (World Intellectual Property Organization) for classifying patents and patent applications (Fall, C.J., et al., 2002).

Automated classification of documents has generated a lot of research interest over the last few years. The huge increase in the number of electronically available documents during this period has made intellectual classification and indexing increasingly difficult and costly. For organisations with an interest in the storage, handling and retrieval of documents, automated classification tools are often seen as a useful remedy against the explosion of costs arising from intellectual document indexing and classification (Richer, G. and MacFarlane, 2004).

Patents and patent applications are a typical example of this scenario. There was a six-fold increase in the number of PCT applications between 1990 and 2001. Not only patent offices but also commercial patent information providers are struggling to come to terms with the volume of information published in patents. For patent offices, the primary classification task is the association of International Patent Classification codes as well as national or European classifications. These classification systems are too fine to realistically achieve sufficiently high accuracy by automated classifiers so some efforts have focused on using them for the pre classification stage, where patent applications are associated to the appropriate technical unit for the examination phase. Texts of patents are widely and freely available on the World Wide Web, making patents ideal subjects for automated classification. Consequently, various publications have described attempts of automated patent classification over the last years. Most of these have originated from patent offices, possibly due to the confidentiality that is often applied by commercial organisations with regards to their research (Richer, G. and MacFarlane, 2004).

A brief description of each method is given from a to q indexed below. "a" to "j" introduction and classification is given by Yang, Y. (1999).

a. CONSTRUE

CONSTRUE is an expert system developed at the Carnegie Group, and the earliest system evaluated on the Reuter corpus (Hayes and Weinstein 1990). Impressive results (about 90% in both recall and precision, on average) were reported on a small subset (3%) of this corpus. A major difference between the CONSTRUE approach and the other methods considered is the use of manually developed domain specific or application specific rules in the expert system. Adapting Construe to other application domains would be costly and labor-intensive.

b. Decision Tree

Decision Tree (Dtree) is a well-known machine learning approach to automatic induction of classification, Dtree algorithms are used to select informative word based on an information gain criterion, and predict categories of each document according to the occurrence of word combinations in the document. Evaluation results of Dtree algorithms on the Reuters text categorization collection were reported by Lewis and Ringutte (Using the IND package) (Lewis and Ringutte 1994) and Moulinier (using C4.5)(Moulinier 1997), respectively.

c. Naïve Bayes Method

Naïve Bayes (NaiveBayes) probabilistic classifier is also commonly used in text categorization (Mitchell 1996). The basic idea is to use the joint probabilities of words and categories to estimate the probabilities of categories given a document. The naïve part of such a model is the assumption of the word independence. The simplicity of this assumption makes the computation of the NaiveBayes classifier far more efficient than the exponential complexity of non-naïve Bayes approaches because it does not use word combinations as, Predictors. Evaluation results of NaiveBayes on Reuters were reported by Lewis and Ringuette (1994) and Moulinier(1997), respectively.

d. Inductive rule learning

Inductive rule learning in Disjunctive Normal Form (DNF) was tested in theWASP-1. RIPPER and CHARADE systems (Apte 1994, Moulinier 1994, Cohen and Singer 1996). DNF rules are of equal power to Dtrees in machine learning Theory (Mitchell 1996). Empirical Results for the comparison because DNF and Dtree approaches, however, are rarely available in text categorization, excepts in an indirect comparision by Apte et al.,1994.

e. Neural network

Neural network (N Net) approaches to text categorization were evaluated on Reuters by Wieners (1995) and Ng (1997), respectively. For convenience, the former system (development at Xerox PARC) is referred to as N Net. There is another system name CLASSI. Both systems use a separate neural network per category, learning a non-linear mapping from input words (or more complex such as singular vectors of a documents space) to a category. The PARC group tried both a perceptron approach and the three-layered neural networks, however, are available only on a subset of the Reuters categories, which are common in evaluation of other systems. The CLASSI system only uses preceptrons.

f. Rocchio method

Rocchio is a classic vector-space-model method for document routing or filtering in information retrieval. Applying it to text categorization, the basic idea is to construct a prototype vector per category using a training set of documents. Given a category, the vectors of documents belonging to this category are given a positive weight, and the vector remaining documents are given a negative weight. By summing up these positively and negatively weighed vectors, the prototype vectors of this category is obtained this methods is easy to implement and efficient in computation and has been used as baseline in several evaluation (Lewis 1996, Cohen and Singer 1996). A positive weakness of this method is the assumption of one centeroid per category, and consequently, Rocchio does not perform well when the documents belonging to a category naturally from separate clusters.

g. Least Squares Fits

LLSF stands for Linear Least Squares Fits, a mapping approaches developed by Yang (Yang and Chute 1992). A multivariate regression model is automatically learned from a training set documents and categories. The training data are represented in the form of input/out put pairs where the input vectors are documents in the conventional vector space model (consisting of word with weights). And the output vector consists of categories (with binary weights) of the corresponding document. By solving a linear least square fit on the training pair of vectors, one can obtain a matrix of word category regression coefficients. The matrix defines a mapping from an arbitrary document to a vector of weighted categories. By sorting these category weights, a ranked list of categories is obtained for the input document.

h. Sleeping Experts

Sleeping experts (EXPERTS) are on-line learning algorithm recently applied to text categorization (Cohen and Singer 1996). On-Line learning aims to reduce the computation complexity of the training phase for large applications. EXPERTS update the weights of n-gram phrases incrementally.

i. K-nearest neighbor classification

KNN stands for K-nearest neighbor classification. Given an arbitrary input document, the system ranks its nearest neighbor among the training documents, and uses the categories of the k top ranking to predict the categories of the input document. The similarity score of each neighbor document to the new document being classified is used as the weight of each of its categories, and the sum of the category weight over the k nearest neighbors is used for category ranking.

j. WORD

WORD is a simple, non-learning algorithm, which ranks categories for a document based on word matching between the document and category names. The

purpose of testing such a simple method is to quantitatively measure how much an improvement is obtained by using statistical learning compared to a non-learning approach. The conventional vector space model is used for representing documents and category names (each name is treated as a bag of words), and the smart system (Salton 1989) is used as the search engine.

k. Multi-classification ranking technique (Fall, C., et al., 2002)

It made used of two automated categorization tools for a series of multi-classification ranking tasks: the "rainbow" package, part of the bow (bag-of-words) toolkit (McCallum 1996), and the "SNOW" (sparse network of winnows) learning architecture (Carlson 1999). The rainbow package implements multinomial Naive Bayes (NB), k-Nearest Neighbors (k-NN), and Support Vector Machine (SVM) algorithms. The SNoW package is tailored for learning in large feature spaces and implements a sparse network of linear functions where the class labels are represented as linear functions over a common feature space (Carlson, 1999). A variation of the winnow update rule is used for training. SNoW is run with word occurrence indexing (binary weighting), which was found to produce better results than word frequency indexing, the same collection of stop words as rainbow.

Overall, it is found that support vector machine algorithm outperforms the Naive Bayes, k-NN, and SNoW algorithms under similar conditions, particularly for categorization at IPC subclass level. However, because it is computationally expensive to train, it may be necessary to reduce the training complexity, by limiting the number of training documents, by term selection, and/or by limiting the length of the documents.

l. Classification Methodology (Legakis, L., 1993)

Classification retrieval is inherently a problem of determining the closeness of two attribute vectors. The first vector is the list of words supplied by the user. The second vector describes for each classification in the classification scheme a list of words derived from the patents in the respective classification. Each word of the second vector can have an associated numeric value that is a measure of the relevance of the word to each classification. A method of determining the relevance of a list of

words to a respective classification using machine extractable information inherent in the patents and the classifications was explored.

m. Co-citation Analysis (Lai, K et al., 2003)

The focus of the co-citation analysis is on the documents cited, by calculating the frequency of A and B that are co-cited by specific documents. They assess the similarity of A and B based respectively on the number of co citing or co-cited documents. Stuart and Podoly (1996) applied the conception of corporate patent co-citation to enable firms to be positioned and grouped according to the similarities in their patents. There approach can be divided in to three phases. Phase I selects appropriate databases to conduct patent searches according to the subject and objective of this study and then select basic patents. Phase II uses the co-cited frequency of the basic patent pairs to assess their similarity. Phase III uses factor analysis to establish a classification system and assess the efficiency of the proposed approach. The main contribution of this approach is to develop a patent classification system based on patent similarities to assist patent manager in understanding the basic patents for a specific industry, the relationships among categories of technologies and the evolution of a technology category.

n. Fuzzy Relational Thesaurus (Tikk, D., et al., 2001)

Text categorization is the classification to assign a text document to an appropriate category in a predefined set of categories. It presents a new approach for the text categorization by means of Fuzzy Relational Thesaurus (FRT). FRT is a multilevel category system that stores and maintains adaptive local dictionary for each category. The goal of their approach is twofold one, to develop a reliable text categorization method on a certain subject domain, and second to expand the initial FRT by automatically added terms, thereby obtaining an incrementally defined knowledge base of the domain. We implemented the categorization algorithm and compared it with some other hierarchical classifiers. Experimental results have been shown that our algorithm outperforms its rivals on all documents corpora investigated.

o. Metadata (Richer G., 2004)

During the last decade, the advance of machine-learning tools and algorithms has resulted in tremendous progress in the automated classification of documents. However, many classifiers base their classification decisions solely on document text and ignore metadata (such as authors, publication date, and author affiliation).The k-Nearest Neighbor algorithm was developed for the classification of patents into two different classification systems. Those using metadata (in this case inventor names, applicant names and International Patent Classification codes) were compared with those ignoring it. The use of metadata could significantly improve the classification of patents with one classification system, improving classification accuracy from 70.8% up to 75.4%, which was highly statistically significant. However, the results for the other classification system were inconclusive: while metadata could improve the quality of the classifier for some experiments (recall increased from 66.0% to 68.9%, which was a small but nonetheless significant improvement), experiments with different parameters showed that it could also lead to a deterioration of quality (recall dropping as low as 61.0%).

p. Probabilistic Rocchio Method (Joachim T., 1997)

The Rocchio relevance feedback algorithm is one of the most popular and widely applied learning methods from information retrieval. Here, a probabilistic analysis of this algorithm is presented in a text categorization framework (Thorsten Joachims). The analysis gives theoretical insight into the heuristics used in the Rocchio algorithm, particularly the word weighting scheme and the similarity metric. It also suggests improvements, which lead to a probabilistic variant of the Rocchio classifier. The Rocchio classifier, its probabilistic variant, and a naive Bayes classifier are compared on six text categorization tasks. The results show that the probabilistic algorithms are preferable to the heuristic Rocchio classifier not only because they are better founded, but also because they achieve better performance.

q. Distributional Clustering (Bakerti, L. 1998)

This describes the application of Distributional Clustering to document classification. This approach clusters words into groups based on the distribution of class labels associated with each word (L. Douglas Bakerti, Andrew Kachites McCallumlt 1998). Thus, unlike some other unsupervised dimensionality reduction techniques, such as Latent Semantic Indexing, we are able to compress the feature space much more aggressively, while still maintaining high document classification accuracy. Experimental results obtained on three real-world data sets show that we can reduce the feature dimensionality by three orders of magnitude and lose only 2% accuracy-significantly better than Latent Semantic Indexing, class-based clustering, feature selection by mutual information, or Markov-blanket-based feature selection. We also show that less aggressive clustering sometimes results in improved classification accuracy over classification without clustering.

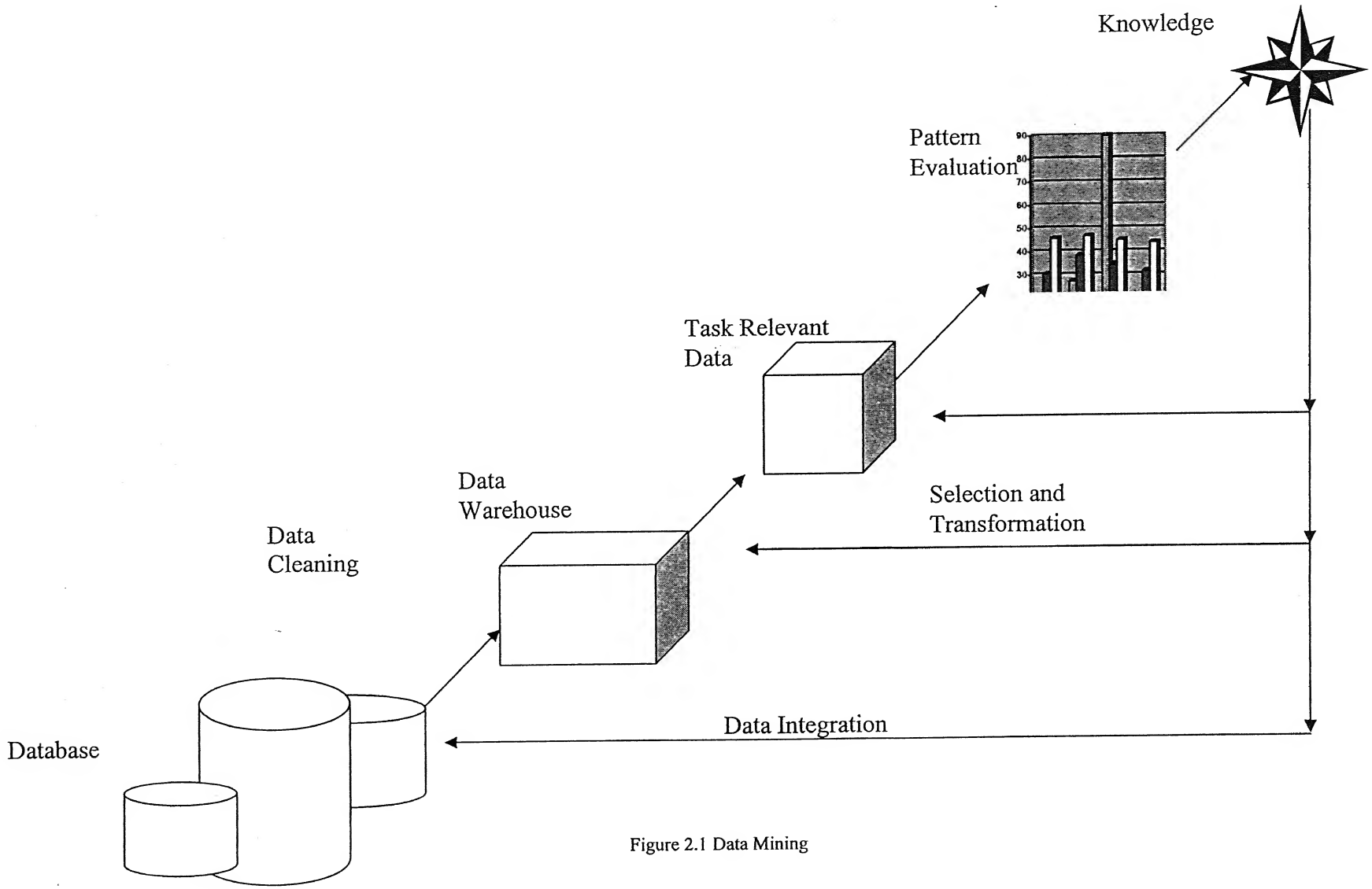

Figure 2.1 Data Mining

CHAPTER 3

SUPPLY CHAIN MANAGEMENT

A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. Supply chains exist in both service and manufacturing organizations, although the complexity of the chain may vary greatly from industry to industry and firm to firm.

Practices experienced in the traditional management of the supply chain raised the need for conversion to a new paradigm of supply chain management (SCM). The traditional supply chain and manufacturing processes relied on experience and intuition of managers and were designed with long supply cycle times, large batch sizes, capacity based on annual volumes, volume-driven technology, and numerous suppliers for the same parts on the short-term base contracts. With traditional management processes, the goal of business activities was to maximize the efficiency of an individual functional unit by achieving competitive edges based on cost reduction. Under the traditional supply chain, efforts of manufacturers to meet the increased changing of customer requirements caused decreased margins, poor service performance, increased overhead costs, poor production process reliability, increased downtime due to changeovers, and high inventory levels of raw materials and finished product. None of these conditions are viable in a competitive market. Most product supply systems are out of balance with customer requirements (Lummus, Vokurka, & Alber, 1998). Davis (1993) listed reasons why SCM needs renewed attention: reduced profit margins due to pressure from increasing competition, needs for administrating multisite manufacturing, cut-throat marketing channels, maturation of the world economy, customer service demands for quick and more reliable delivery, and ressure to reduce inventories. According to Cooper and Ellram (1993), SCM is designed to solve these problems and is important to reduce inventory investment in the chain, to increase customer service, and to help build a competitive advantage for the channel. With a changing management focus, companies also began to realize that

maximization of efficiency in one department or one functional unit is less desirable than optimal performance for the whole company. Needs for effective vertical integration and consumers' desire for a wider variety and complexity of products have led to demand for SCM (Lummus, Vokurka, & Alber, 1998).

3.1 Definition

Different people have stated supply chain in different terms. One of the definitions of supply chain, which is given by Ganeshan and Harrison, is: "A supply chain is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers". Supply chain can be considered as a series of processes that change and add value to a product as it moves down the chain.

The concept of SCM is relatively new to academics and practitioners, appearing first in 1982 (Cooper, Lamber, & Pagh, 1997). Although the term, supply chain management, has been used since the 1980s and the academic and trade presses have given extensive attention to the concept, confusion still persists in defining what is SCM (Bechtel & Jayaram, 1997). Many researchers have tried to define the meaning of SCM. Table 2-2 provides the summary of each author's definitions. Although subtle differences are found in the word choice and expression, commonalities contribute to an understanding of core concepts in the definition of SCM. The first component is the range of participants. All of the definitions in Table 2.1 state that all channel members within a company or between companies, including supplier, manufacturer, distributor, and customer, should be involved in the chain activities and collaboration between members. The second component is the flow of materials and information. Agreement across definitions is that materials, whether raw materials or finished goods, and information flow simultaneously both upstream and downstream in the chain. Third, to manage the flow of materials and information and to provide high customer value, integrated and coordinated value-added activities are required (i.e., cross-functional approach, joint planning and forecasting, flexible operations).

Authors	Definition
Alber & Walker (1997)	"The global network used to deliver products and services from raw materials to end customers through an engineered flow of information and physical distribution." (p. 203)
Cooper & Ellram (1993)	"An integrative philosophy to manage the total flow of a distribution channel from the supplier to the ultimate user ... greater coordination of business processes and activities ... across the entire channel and not just between a few channel pairs." (p. 13)
Giunipero & Brand (1996)	"Definitions can be grouped into three major categories: 1) The management of the flow of goods from supplier to final user; 2) The system-wide coordination of product and information flows; and 3) The development of relationships and the integration of all activities that provide customer value throughout the distribution channel." (pp. 29-30)
Jones (as cited in Goffin, Szwejczewski, & New, 1997)	"Managing the entire chain of raw material supply, manufacture, assembly, and distribution to the end customer." (p. 422)
Lee & Ng (1997)	"A network of entities that starts with the suppliers' suppliers and ends with the customers' customers for the production and delivery of goods and services." (p. 191)
Lummus, Vokurka, & Alber (1998)	"A network of entities through which material and information flow. Those entities include suppliers, carriers, manufacturing sites, distribution centers, retailers and customers." (p. 49)
Palevich (1997)	"All of those activities associated with moving goods from raw materials through the end user: sourcing and procurement, production scheduling, order processing, inventory management, transportation, warehousing, and customer service. Importantly, it also embodies the information systems to monitor these activities." (p. 1)
Spekman, Kamauff, & Myhr (1998)	"A process for designing, developing, optimizing, and managing the internal and external components of the supply system, including material supply transforming, materials and distributing finished products or services to customers, that is consistent with overall objectives and strategies." (p. 631)
TICCE (as cited in Cooper, Lambert, & Pagh, 1997)	"The integration of business processes from end user through original suppliers that provides products, services and information that add value for customers." (p. 2)

Table 3.1 Definition in Supply chain Management

3.2 Supply Chain Decisions

The decisions for supply chain management can be classified into two broad categories -- strategic and operational. As the term implies, strategic decisions are made typically over a longer time horizon. These are closely linked to the corporate strategy, and guide supply chain policies from a design perspective. On the other hand, operational decisions are short term, and focus on activities over a day-to-day basis. The effort in these types of decisions is to effectively and efficiently manage the product flow in the "strategically" planned supply chain.

There are four major decision areas in supply chain management: 1) location, 2) production, 3) inventory and 4) transportation (distribution), and there are both strategic and operational elements in each of these decision areas.

3.2.1 Location Decisions

The geographic placement of production facilities, stocking points, and sourcing points is the natural first step in creating a supply chain. The location of facilities involves a commitment of resources to a long-term plan. Once the size, number, and location of these are determined, so are the possible paths by which the product flows through to the final customer. These decisions are of great significance to a firm since they represent the basic strategy for accessing customer markets, and will have a considerable impact on revenue, cost, and level of service. These decisions should be determined by an optimization routine that considers production costs, taxes, duties and duty drawback, tariffs, local content, distribution costs, production limitations, etc. Although location decisions are primarily strategic, they also have implications on an operational level.

3.2.2 Production Decisions

The strategic decisions include what products to produce, and which plants to produce them in, allocation of suppliers to plants, plants to DC's, and DC's to customer markets. As before, these decisions have a big impact on the revenues, costs and customer service levels of the firm. These decisions assume the existence of the facilities, but determine the exact path(s) through which a product flows to and from

these facilities. Another critical issue is the capacity of the manufacturing facilities and this largely depends the degree of vertical integration within the firm. Operational decisions focus on detailed production scheduling. These decisions include the construction of the master production schedules, scheduling production on machines, and equipment maintenance. Other considerations include workload balancing, and quality control measures at a production facility.

3.2.3 Inventory Decisions

These refer to means by which inventories are managed. Inventories exist at every stage of the supply chain as either raw material, semi-finished or finished goods. They can also be in-process between locations. Their primary purpose to buffer against any uncertainty that might exist in the supply chain. Since holding of inventories can cost anywhere between 20 to 40 percent of their value, their efficient management is critical in supply chain operations. It is strategic in the sense that top management sets goals. However, most researchers have approached the management of inventory from an operational perspective. These include deployment strategies (push versus pull), control policies, the determination of the optimal levels of order quantities and reorder points, and setting safety stock levels, at each stocking location. These levels are critical, since they are primary determinants of customer service levels.

3.2.4 Transportation Decisions

The mode choice aspects of these decisions are the more strategic ones. These are closely linked to the inventory decisions, since the best choice of mode is often found by trading-off the cost of using the particular mode of transport with the indirect cost of inventory associated with that mode. While air shipments may be fast, reliable, and warrant lesser safety stocks, they are expensive. Meanwhile shipping by sea or rail may be much cheaper, but they necessitate holding relatively large amounts of inventory to buffer against the inherent uncertainty associated with them. Therefore customer service levels and geographic location play vital roles in such decisions. Since transportation is more than 30 percent of the logistics costs, operating efficiently makes good economic sense. Shipment sizes (consolidated bulk shipments

versus Lot-for-Lot), routing and scheduling of equipment are key in effective management of the firm's transport strategy.

3.3 Supply Chain Benefits

Many previous studies conducted in various industries have revealed tangible benefits generated from efficient SCM (Harrington, 1999; Higginson & Alam, 1997; Alber & Walker, 1997; Palevich, 1997; Giunipero & Brand, 1996; Cooper & Ellram, 1993). The summary of benefits is presented in Table 2.2. These benefits can be categorized into four groups. First, financial benefits were reported: reduction in costs tied with high level of inventory, shipping, and operating costs; cost advantage over competitors; and increased profit margin with lower product costs. These cost reductions were achieved without downsizing, laying off employees, or closing plants. Second, companies' operational activities were improved: reduced cycle times, lower inventory levels, increased stock availability, less stockouts, increased inventory turns, and greater productivity in operations. Third, customer service was increased: more reliable delivery and increased responsiveness to changes. Lastly, closer coordination among channel members is an important benefit. This benefit results in an improvement in the quality of products and information and an increase in the sharing of expertise and risks, which creates a competitive advantage and greater profitability.

Benefits of SCM	Alber & Walker (1997)	Cooper & Ellram (1993)	Giuniper o & Brand (1996)	Harringto n (1999)	Higginso n & Allram (1997)	Palevich (1997)
	Case study of a food compan y	Literatur e analysis	Survey of 52 members of the NAPM a	Conceptu al work	Literatur e analysis	Conceptu al work
Closer relationships with chain members		*	*		*	*
Cost advantage				*		
Cost reduction			*	*		*
Customer service level improvement	*					
Cycle times reduction	*	*	*		*	*
Inventory reduction			*	*	*	
Inventory turns improvement	*	*				
Productivity improvement			*			
Profit margins improvement	*					
Reliable delivery			*		*	
Responsivene ss to changes				*		

Table 3.2 Benefits of supply chain Management

3.4 Element of supply chain management (Watson, E., Class Notes, Louisiana state university)

The six basic elements to the strategic and operational management of the supply chain are

1. Plan (Planning) 2.Buy (Purchasing) 3. Make(Manufacturing)
4. Move (Distribution) 5. Sell (Marketing) 6. Consume (Consumption)

a. Plan (Demand and supply planning):

The planning of, synchronization and deployment of products and services across the entire supply chain to meet both operational needs and customer demands.

b. Buy (Sourcing and Supplier Management):

This involves buying of best materials at the lowest cost. When choosing a supplier, focus should be on developing velocity, quality and flexibility while at the same time reducing costs or maintaining low cost levels. In short, strategic decisions should be made to determine the core capabilities of a facility and outsourcing partnerships should grow from these decisions.

c. Make (Manufacturing and Operations):

For product manufacturers, new strategies such as lean manufacturing, work flexibility, and configure/make-to-order manufacturing are the keys to quantum improvements in cost, speed and quality. Likewise, service sector companies are streamlining operations and deploying new technologies to provide more services faster and at a lower cost.

d. Move (Transportation and Distribution):

Transportation, distribution and warehousing are developing into value-added services through new methods, such as flow optimization, cross-docking, consolidation, non-stop logistics, and tracking and racing systems.

e. Sell (Customer and Order Management):

Customer and order management is where; building on other operational improvements, supply chain differentiation becomes visible to customers. In support of sales and marketing, clients can create revenue-generating competitive differentiation in areas including channel management, product and channel segmentation, product-service bundling, order management and configuration and setting and achieving targeted and customer service levels.

3.5 Importance of supply chain efficiency (Watson, E., 2001)

1. **Improved Customer Service**

This Often means the difference between success and failure for companies. If a "customer" is seeking your product and it is not available when he/she wants it, the customer will purchase someone else's. So, having the right product at the right place at the right time is one way to define "customer service."

2. **Save Money/Reduce costs**

This can be defined in many ways, but in its broadest sense, it includes reducing the cost of getting the product to market. In other words, containing all costs associated with solving the product through the supply-chain. And this usually results in a more time-efficient supply chain as well. According to a recent benchmarking study conducted by Pittiglio Rabin Todd & McGrath (PRTM), one of the founders of the Supply-Chain Council, best in class companies have an advantage in total supply chain management cost of 3 to 6 percent of revenue. (Total supply chain management cost is the sum of Order Management, Material Acquisition, Inventory Carrying, and Supply-Chain Finance, lanning, and MIS Costs.

3.6 Implementing Supply Chain Management (Watson, E., 2001)

- Need to provide extra service to some customers.
- Corporate initiatives aimed at improving on-time delivery.
- Mandates to reduce costs to enable more aggressive pricing.
- Demands for faster delivery of customized products.
- De-coupling of production and storage capabilities through transportation and storage capabilities.
- Focus shifted from process optimization to logistics.
- | Manufacturing ~ 45% | Marketing ~ 25% | Logistics ~ 20% | Profits |
- More instances of multi-site manufacturing where several independent entities are involved in the production and delivery process.
- Increasingly cutthroat marketing and distribution channels.
- Maturation of the world economy and heightened demand for "local" products.
- Competitive pressures to provide exceptional customer service.
- Channel partnership is required to implement just-in-time, quick response strategies.

3.7 Characteristics of Supply Chain Management (Watson, E., 2001)

- Ability to source raw material or finished goods from anywhere in the world.
- Centralized global business and management strategy with local execution.
- On-line, real-time distributed information processing to the desktop, providing total supply chain information visibility.
- Ability to manage information not only within a company but also across industries and enterprises.
- Seamless integration of SCN processes, third-party suppliers, IS cost accounting standards and measurements systems.
- Reconfiguration of the supply chain organization into high-performance teams.

3.8 Advantages Of Supply Chain Management (Watson, E., 2001)

- Lower total delivered costs and lead times
- Improved trading partner relationships and value

- Improved inventory performance in both cost and velocity
- Improved transportation performance in cost, speeds, and service
- Lower break-even costs and times
- Increased revenues
- Increased flexibility/visibility/responsiveness
- Improved customer service and value
- Gained overall competitive advantage/share
- Improved shareholder value

3.9 Seven Principles Of Supply Chain Management (Watson, E.,2001)

1. Segment customers based on service needs

Companies traditionally have grouped customers by industry, product, or trade channel and then provided the same level of service to everyone within a segment. Effective supply-chain management, by contrast, groups customers by distinct service needs-- regardless of industry--and then tailors services to those particular segments.

2.Customize the logistics network

In designing their logistics network, companies need to focus intensely on the service requirements and profitability of the customer segments identified. The conventional approach of creating a "monolithic" logistics network runs counter to successful supplychain management.

3.Listen to signals of market demand and plan accordingly

Sales and operations planning must span the entire chain to detect early warning signals of changing demand in ordering patterns, customer promotions, and so forth. This demand-intensive approach leads to more consistent forecasts and optimal resource allocation.

4. Differentiate products closer to the customers

Companies today no longer can afford to stockpile inventory to compensate for possible forecasting errors. Instead, they need to postpone product differentiation in the manufacturing process closer to actual consumer demand.

5. Strategically manage the source of supply

By working closely with their key suppliers to reduce the overall costs of owning materials and services, supply-chain management leaders enhance margins both for themselves and their suppliers. Beating multiple suppliers over the head for the lowest price is out, Andersen advises. "Gain sharing" is in.

6. Develop a supply-chain-wide technology strategy

As one of the cornerstones of successful supply-chain management, information technology must support multiple levels of decision making. It also should afford a clear view of the flow of products, services, and information. Develop a supply-chain-wide technology strategy.

7. Adopt channel-spanning performance measures.

Excellent supply-chain measurement systems do more than just monitor does internal functions. They adopt measures that apply to every link in the supply chain. Importantly, these measurement systems embrace both service and financial metrics, such as each account's true profitability.

CHAPTER 4

PROBLEM DESIGN AND DATA COLLECTION

Initially we downloaded patents related to field of supply chain management from USPTO and EPO using an initial set of keywords. Patents from different sources are in different HTML formats and scripts, so they cannot be used directly for further processing. Especially USPTO files, have unstructured format with lots of codes and scripts in HTML data. This requires parsing of these file so that they can be read in database.

The standard methodology shown in figure 4.1 is used to parse the files in acceptable format. First tag file from unstructured file is crated and then this tag file is converted in to XML files. These file are then read into a database with specified field structure.

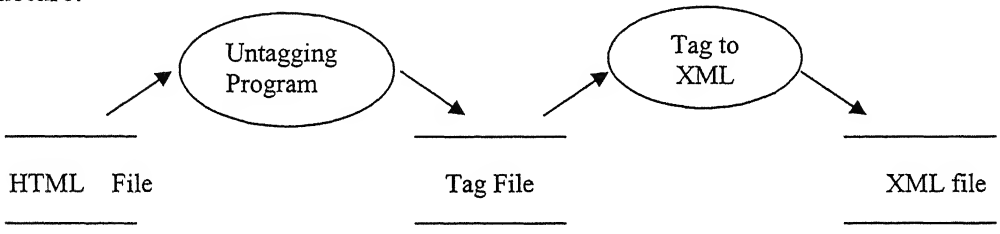

Figure 4.1: Parsing

After the initial phase, which was patent search and conversion in to XML second phase followed. In the second phase Mirdha, Bhuvanesh (2004) used K nearest neighbor methodology for mapping of patents documents.

The mapping was done for the purpose of classification of the patents in three level of hierarchy in various subclasses. Our attempt is to further improve the accuracy and precision of such classification.

4.1 Metadata

It has been stated in literature review (Ritcher, G., et al., 2004), that use of metadata improves accuracy. Metadata is commonly described as "data about data". It is usually distinguished from the data itself through suitable mark-up or by being

stored in a physically different location. In the case of textual data, common types of metadata are author, the date of publication or keywords and descriptors. An important difference between (textual) data and metadata on the linguistic level is the fact that metadata elements become semantically meaningful through the "field" in which they occur, whereas textual data elements obtain their meaning through linguistic rules and their position within their context.

4.1.1 Classification of Metadata

In context of patent classification problem the metadata is all the relevant information that patent provides us along with Keywords. In our case we have taken following attribute to represent metadata

- Keywords
- Keyword-pair
- Author name
- Assignee name
- I-class
- U-class
- Citation

Keywords are further divided in to three classes, depending on its location. For the purpose of better classification we have to consider different weightage to Keywords depending upon the location. For example Keywords, which are in the Abstract and Title are likely to be more important, compared to Keywords, which are present in Claim part.

The Keywords-pair are used because it is seen that certain pair of Keywords occurring in the same document are better classifier then the single Keyword.

Author and Assignee name are being used in the classification as metadata because it is general perception that people and company like to work in certain area (represented by class), at a time.

I-class and U-class are found in every USPTO patent. The reason of using them, as metadata is that correlation has been observed in the attribute data and subclasses. It may be noted that for traditional Technology I-class and U-class are robust classifiers. However for business method and software patents systems it is not well developed.

Patent citations are defined as the count of citations of a patent in subsequent patents, and citations per patent represent the relative importance of the patent. Based on this idea, patent citation analysis executes a bibliometrics analysis on patent documents. In essence, citation-based technique attempts to link patents in a patent database in the same way as science citation analysis links references in a scientific paper database (Karki, 1997). Ultimately, patent citation analysis produces such technological indices as citations per patent, highly cited patents, no patent link, technical impact index, current impact index, technology cycle time, and so forth. It is natural for the patent having similar nature to cite each other.

4.2 Data Analysis

Based on the various attributes discussed earlier, first step is to create vector for each patent document with all related attributes. The step-by-step methodology is discussed in following sections.

4.2.1 Methodology

There are three levels in hierarchy of SCM classification as the result of work done by Mirdha, Bhuvanesh (2004). In each level there are subclasses. The initial step is to find out important attributes, relevant to a subclass. The frequency with which an attribute appear in a subclass is taken as a measure of relevance. Table 4.1 shows an example of collection of data with respect to keywords and frequency of their occurrence for different subclasses.

Keywords	f	Subclass
Allocation	4	Sce
Allocation	2	Scp
Allocation policy	2	Scp
Assembly line	2	Sce
Automatically	14	Sce
Automatically	5	Scp

Table 4.1 Frequency distribution

Here second column denotes number of times that keywords are repeated in particular subclass. By this we are able to identify which attribute is more significant in a particular subclass. Similar compilation has been done for all attributes for every subclass.

4.2.2 Data cleaning

Once data about frequency of attributes in subclass is complied, data is analyzed to identify those attributes, which are more frequent in a given subclass but are less frequent in other subclasses. These attributes are relevant for a document to be classified in a specific subclass. Table 4.2 shows an example of this compilation

Keyword	f	Ratio	No. Of Patents	Subclass
Enabling access	2	0.035088	57	Decision support system: -
Enterprise	16	0.056537	283	Sce
Enterprise	17	0.22973	74	Scp
Enterprise	5	0.108696	46	E-commerce
Enterprise	7	0.35	20	Strategic planning

Table 4.2 Data cleaning

As shown in Table 4.2, we compare ratio among the subclass, which are at same level. We neglect those attributes data for which frequency ratio is more or less equal to each other. The purpose of data cleaning is to reduce the data size and to identify important attributes for each subclass. Similar analysis is done for all other attributes. The results of this analysis are given in **Annexure C-J**.

4.2.3 Data Integration

We have the data about relevant attributes. To do further analysis we have to assign weight to these attributes. After the data cleaning we have attributes value in form of ratio as discussed in section 4.2.2.

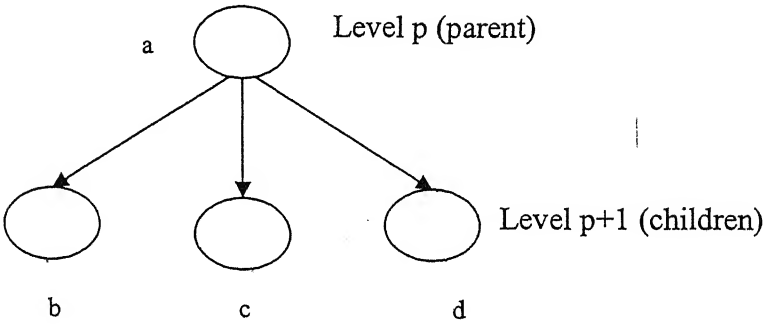

Fig 4.2 Subclasses distribution

In fig 4.2 a, b, c and d represents subclasses. While a, belong to level p of hierarchy other represent lower level (p+1). If an attribute occurs with the same frequency in a child node as in a parent node, then its value to discriminte the document in lower level subclasses is insignificant. Hence for each attributes or subclass level we consider the ratio of relative frequency in parent and child node.

Keywords	f	Subclass	Ratio 1	Ratio 2
Enterprise	16	Sce	0.05654	
Enterprise	17	Scp	0.22973	
Enterprise	5	E-commerce	0.1087	1.922554
Enterprise	7	Strategic planning	0.35	1.523529
Enterprise	7	Bssc	0.41176	1.176471

Table 4.3 Ratio 2 calculations

Here as shown in Table 4.3 E-commerce, Strategic planning and Business strategy for supply chain are subclasses belonging to lower level while Sce and Scp belongs to higher level. Ratio 1 is ratio that we have found and discussed in section 4.2.2.For a child subclass ratio 2 is calculated as

$$\frac{\text{Ratio 1(Parent Node)}}{\text{Ratio 1(Child Node)}}$$

Ratio 2 for b gives the probability of document in a (Parent node), being classified in lower level subclasses b. Similar ratio 2 for c, and d respectively gives the probability of document being classified in those subclasses b. If we use Ratio 2 as classifier it will not be good predictor, if it has similar value for all subclass at a given level.

As, these ratio can have large range so we normalize these ratios. After the normalization the value of Ratio 2 will be between, 0 to 1. For normalization we add values of all child subclass of patent (Ratio 2) together and divide the sum into the ratio of the subclass. For example for attribute 'b' the value after normalization will be given as

$$Ratio3_b = \frac{(Ratio2_b)}{(Ratio2_b + Ratio2_c + Ratio2_d)}$$

Keywords	f	Subclass	Ratio 1	Ratio 2	After Normalization (Ratio 3)
Inventory	42	Sce	0.14841		0.687401084
Inventory	5	Scp	0.06757		0.312957701
Inventory	3	Assembly plant management	0.125	0.842262	0.094636169
Inventory	4	Logistic management	0.17391	1.171843	0.131667713
Inventory	2	E-commerce	0.04348	0.292961	0.032916928

Table 4.4 Normalization table

Figure 4.4 shows final value of attribute (here, keyword inventory) after normalization.

4.2.4 Patent Attribute Vector

Table 4.5 shows the groups and the numbers in each group of attributes, as well as the measure of the value in patent document. An attribute vector for each document is prepared. An example for such a document is shown in Table 4.6.

Attributes groups	Number of Attributes	Measure
Keyword Abstract	66	Frequency
Keyword Claim	73	Frequency
Keyword Title	43	Frequency

I-class	60	Presence/Absence
U-class	94	Presence/Absence
Author Name	165	Presence/Absence
Assignee Name	14	Presence/Absence

Table 4.5 Attribute Data

Keyword Abstract		**Keyword Claim**		**Keyword Title**		**Keyword Pair**		**I-class**		**U-class**		**Author Name**		**Assignee Name**	
Kwa_i	W	Kwc_i	0	Kwt_i	O	Kwp_i	0	I_i	1	U_i	0	Aun_i	0	Asn_i	1
Kwa_j	0	Kwc_j	W	Kwt_j	W	Kwp_j	0	I_j	0	U_j	0	Aun_j	0	Asn_j	0
Kwa_k	W	Kwc_k	W	Kwt_k	0	Kwp_k	W	I_k	0	U_k	1	Aun_k	1	Asn_k	0

Table 4.6 Attribute vector for a subclass

For all these attributes we have their weight for each subclass, completed on the basis of present classification. For each class in classification, we prepare a vector of attributes, where weight is calculated in previous section as ratio 3, is assigned to the attribute. If an attribute is not present it assume zero value. Table 4.6 attributes vector for such vector in a subclass.

4.2.5 Data mining technique

Data mining techniques are those set of techniques, which are applied to extract potentially useful patterns. The purpose of these methods is to improve the accuracy of the patent classification. The techniques used here is to develop discriminant function, for each class such that it can calculate the document which are relevant to a class and differentiate relevant document from these which are not relevant.

Attributes related to Keywords have weight in-between 0-1. For other attributes it is either 0 or 1. To classify a patent document, further in to subclass first of all every weight of each attributes is checked. For each of the subclass, If any of these weight(s) is equal to one for a particular subclass then, patent document is

directly classified in to this subclass. If none of the weight is found to be one for any of the subclass then a weighted function of attribute is developed.

We have selected following function for the purpose.

1. $\sum fi*wi$ (Linear Weight)

"f_i" is frequency of occurrence of i^{th} attribute in a patent document.

"w_i" is the weight of the attribute for the given class.

2. $\sum fi*wi^2$ (Square Weight)

3. $\sum fi*wi^*$ (Indexed Weight)

The indexed weights are assigned as follows:

S. No	Original weight range	Modified weight
1.	1	1
2	1-.9	.9
3.	.9-.6	.7
4.	.3-.6	.5
5.	Less then .3	0

Table 4.7 Modified Weight

4. Discriminant analysis (Statistical Technique)

To choose the appropriate function we selected a sample of 25 documents from Supply chain planning subclass. Patent Document from SCP is further classified in to a) Strategic Planning (SP) b) Tactical Planning (TP) c) Operational Planning (OP). We have calculated value of all 25 documents for each of the subclass for these three functions.

Every document in parent subclass value is determined by running functions shown above representing each of child subclass. Next step is to compare results for child subclasses whichever child subclass gives maximum value for a given function for a document that document get classified under that subclass.As, we have discussed that for each document we found its value of each subclass for every function. The example of calculation of value of function and thus subclass determination is shown below.

Patent No.	Function	SP	TP	OP	Manual Reading	Status
5.xml.txt	f1	2.3465314	0.641733	0.5433	SP	Correct
	f2	1.493742	0.134683	0.1587	SP	Correct
	f3	2.1	0.3	0.9	SP	Correct
14.xml.txt	f1	0.359375	1.6487	0	TP	Correct
	f2	0.6	0.1	0	TP	Correct
	f3	0.2	3.1	0	SP	Wrong

Table 4.8 Calculation of function value

The complete table of classification of document is shown in table 4.9.Here each cell denote the status of patent document according to function value. Last column denotes the correct status as found out by manual reading of document. The irrelevant documents are those which aren't related to supply chain management patent. The detailed result has been shown in Annexure K.

Patent No.	function 1	function 2	function 3	Manual Reading
1.xml.txt	sp	irrelevent	sp	irrelevent
2.xml.txt	sp	sp	sp	sp
3.xml.txt	op	tp	sp/tp	op
4.xml.txt	tp	sp	sp	tp
5.xml.txt	sp	sp	sp	sp
6.xml.txt	sp	sp	sp	sp
7.14.xml.txt	sp	tp	sp	sp
7.21.xml.txt	sp	sp	sp	op
7.22.xml.txt	tp	sp	sp	tp
7.26.xml.txt	irrelevent	irrelevent	sp	irrelevent
7.xml.txt	sp	irrelevent	sp	irrelevent
8.xml.txt	op	sp	sp	op
9.xml.txt	sp	sp	sp	irrelevent
10.xml.txt	sp	sp	sp	sp
11.xml.txt	sp	sp	sp	sp
12.xml.txt	sp	irrelevent	sp	irrelevent
13.xml.txt	irrelevent	irrelevent	op	irrelevent
14.xml.txt	tp	sp	tp	tp
15.xml.txt	sp	tp	sp	sp
16.xml.txt	op	op	op	op
1287.xml.txt	sp	sp	sp	irrelevent
1293.xml.txt	tp	tp	sp	tp
19-8.xml.txt	sp	sp	sp	sp
19.xml.txt	tp	tp	sp/tp	tp
18.xml.txt	sp	sp	sp	sp

Table 4.9 Status of patent document

At last, we have found out the number of correctly classified document given by each of the three functions.

Function	correct	wrong
function 1	19	6
function 2	14	11
function 3	9	16

Table 4.10 Accuracy by functions

Function 4(Standardized Discriminant Functions)

After running query in SPSS we found following function

Abstract	1
EAS	-0.811
Information	-0.177
Node	0.304
Planning engine	-0.307
Forecast	5.137
Location	-2.215
Schedule	1.325
claim	
Planning engine	0.159
Computer implemented	-0.286
Location	3.461
Forecast	-1.985
Display	1.935
title	
Enterprise	-0.193

Table 4.11 Discriminating Function

The result of running the discriminant function

Patent No.	Function value
1.xml.txt	-0.811
10.xml.txt	-0.5430468
11.xml.txt	-0.72617173
12.xml.txt	6.895
1287.xml.txt	1.5822247
1293.xml.txt	0
13.xml.txt	1.7556251
14.xml.txt	9.077225
15.xml.txt	-0.7829055
16.xml.txt	3.461

Table 4.12 Function 4 Results

We haven't used discriminant function for the calculation purpose as most of the words were found insignificant in the analysis also the plot that we obtained from this function wasn't able to discriminant between various lower level classes. On running the results on 25 sample documents and analyzing the results following observation were made.

- First two discriminant function produced similar result is most of the case.
- Discriminant analysis gave very few significant words and their weight when discriminating function based on this used for classification purpose it was unable in classifying between documents belonging to different subclass.
- Modified weight function at a few times produced similar value so it was not possible to classify document in either category.
- The differences between values of weight as given by second function were less.
- For the documents which are non-relevant, second function shown best result as, function value of these document are very small.

Overall we found out that first function gives best result amongst all the four functions used. For classifying the relevant document into subclasses, we use this function for the purpose of classifying relevant document. Second function is purposed to be used for searching any non-relevant document.

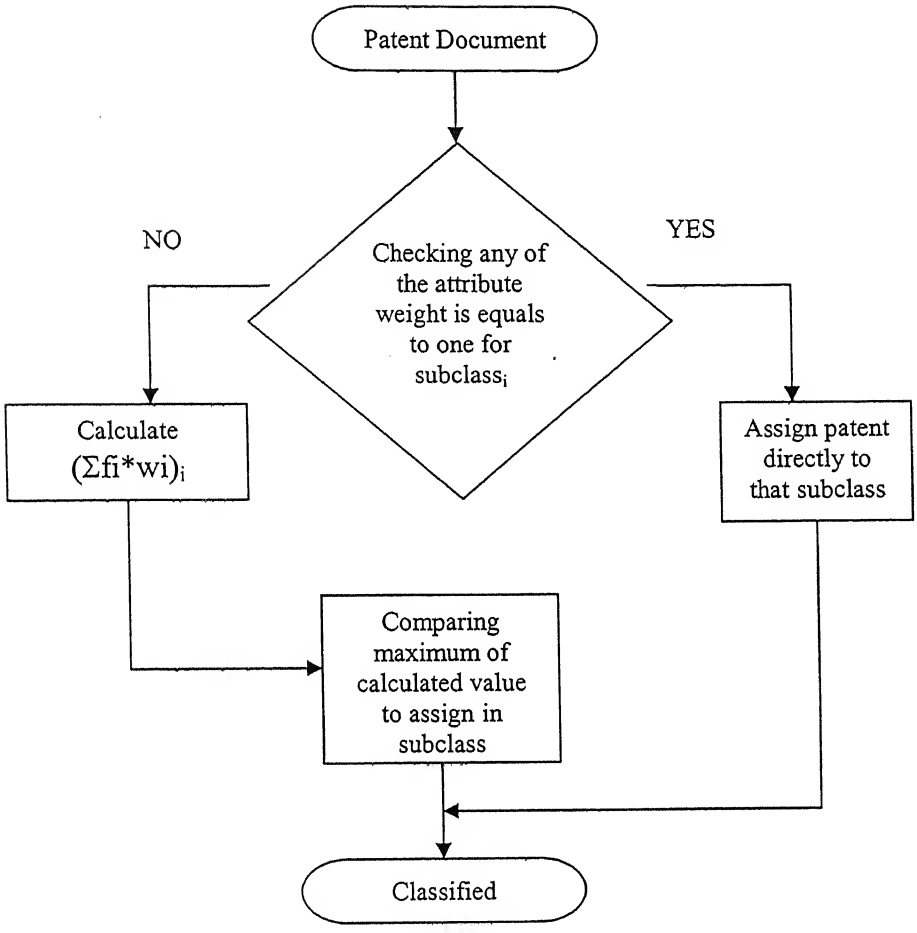

Fig 4.3 classification of patent document

CHAPTER 5

RESULTS AND DISCUSSION

The application of methodology on patent documents for classification in various subclasses has produced results for those subclasses. For the purpose of effective representation of results we have used contingency table. In this table classification effectiveness is mainly measured using the notions of Precision (P) and Recall(R). Precision is defined as the probability that a document classified in a particular class is correctly classified and it belongs to that class. For a class Recall is defined as the probability that a document is correctly classified in that class. Both Precision and Recall are measured as shown in contingency table 5.1.

Subclass		Manually reading	
		Yes	No
Results by Classifier (analysis)	Yes	TP_i	FP_i
	No	FN_i	TN_i

Table 5.1 Contingency table

In table 5.1, the number of documents that have been correctly classified under a subclass is called as True Positive (TP_i). False Positive (FP_i) are those documents that have been incorrectly classified under that subclass. True Negative (TN_i) are those non relevant documents that have been classified correctly. False Negative (FN_i) are incorrectly classified documents also known as Errors of Omission and indicate the incorrect prediction that an instance is negative.

Estimate of Precision (P) = $\frac{TP_i}{TP_i + FP_i}$ and Estimate of Recall (R) = $\frac{TP_i}{TP_i + FN_i}$

5.1 Level 0-1

Here we have applied following function over the patents at level 0. Level 0 means those patents which are found to be relevant but are not classified into next (First) sublevel. Here, we have to find out the next subclass from application of Analysis.

5.1.1 Supply Chain Planning

Subclass: Supply Chain Planning		Manual reading	
		Yes	No
Results by Classifier	Yes	33	13
	No	5	1

P	.71739
R	.9704

In this classification 33 is the value of TP_{scp} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{scp} is 13 and FN_{scp} is 5. This means 13 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified 5 documents that should have been classified in SCP class. 1 represents that document which doesn't belong to subclass and is being correctly classified as TN_{scp} by both methods. P means Precision and R means Recall, there values are given as .71739 and .9704 respectively.

5.1.2 Supply Chain Execution

Subclass: Supply Chain Execution		Manual reading	
		Yes	No
Results by Classifier	Yes	71	25
	No	4	10

P	.74
R	.9466

In this classification 71 is the value of TP_{sce} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{sce} is 25 and FN_{sce} is 4. This means 25 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified 4 documents that should have been classified in SCP class. 10 represent those documents which don't belong to subclass and is being correctly classified as TN_{sce} by both methods. P means Precision and R means Recall, there values are given as .74 and .9466 respectively.

5.2 Level 1-2

After finding out subclasses SCE and SCP. Next step is to further classify them into lower level subclasses. SCP is to be further classified into three subclasses 1.) Operational Planning 2.) Strategic Planning 3.) Tactical Planning.

5.2.1 Operational Planning

Subclass: Strategic Planning		Manual reading	
		Yes	No
Results by Classifier	Yes	11	3
	No	0	3

P	.785
R	1

In this classification 11 is the value of TP_{op} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{op} is 3 and FN_{op} is 0. This means 3 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 3 represent those documents which don't belong to subclass and is being correctly classified as TN_{op} by both methods. P means Precision and R means Recall, there values are given as .785 and 1 respectively.

5.2.2 Strategic Planning

Subclass: Strategic Planning		Manual reading	
		Yes	No
Results by Classifier	Yes	10	6
	No	0	6

P	.625
R	1

In this classification 10 is the value of TP_{sp} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{sp} is 6 and FN_{sp} is 0. This means 6 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 6 represent those documents which don't belong to subclass and is being correctly classified as TN_{sp} by both methods. P means Precision and R means Recall, there values are given as .785 and 1 respectively.

5.2.3 Tactical Planning

Subclass: Tactical Planning		Manual reading	
		Yes	No
Results by Classifier	Yes	12	2
	No	0	0

P	.86
R	1

In this classification 12 is the value of TP_{tp} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{tp} is 2 and FN_{tp} is 0. This means 2 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 0 represent that no document belongs to the subclass and is being correctly classified as TN_{tp} by both methods. P means Precision and R means Recall, there values are given as .86 and 1 respectively.

In the similar manner SCE patent documents can be further classified into their subclasses at level 2. Here the classification is done into

- Assembly Plant Management
- Decision Support System
- E-commerce
- Information System
- Inventory Management
- Logistic Management
- Manufacturing Control Facility
- Miscellaneous
- Transportation Management

5.2.4 Assembly Plant management

Subclass: Assembly Plant management		Manual reading	
		Yes	No
Results by Classifier	Yes	10	10
	No	0	3

P	.5
R	1

In this classification 10 is the value of TP_{apm} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{apm} is 10 and FN_{apm} is 0. This means 10 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 3 represent those documents which don't belong to subclass and is being correctly classified as TN_{apm} by both methods. P means Precision and R means Recall, there values are given as .5 and 1 respectively.

5.2.5 Decision Support System

Subclass: Decision support system		Manual reading	
		Yes	No
Results by Classifier	Yes	11	6
	No	1	2

P	.65
R	.92

In this classification 11 is the value of TP_{dss} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{dss} is 6 and FN_{dss} is 1. This means 6 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified 1 document that should have been classified in SCP class. 2 represent those documents which don't belong to subclass and is being correctly classified as TN_{dss} by both methods. P means Precision and R means Recall, there values are given as .65 and .92 respectively.

5.2.6 E-Commerce

Subclass: E-Commerce		Manual reading	
		Yes	No
Results by Classifier	Yes	31	13
	No	0	5

P	.70
R	1

In this classification 31 is the value of $TP_{e\text{-}com}$ in the documents, which are correctly classified by the Classifier (Analysis). The value of $FP_{e\text{-}com}$ is 13 and $FN_{e\text{-}com}$ is 0. This means 13 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 5 represent those documents which don't belong to subclass and is being correctly classified as $TN_{e\text{-}com}$ by both methods. P means Precision and R means Recall, there values are given as .7 and 1 respectively.

5.2.7 Information System

Subclass: Information System		Manual reading	
		Yes	No
Results by Classifier	Yes	8	3
	No	2	1

P	.72
R	.8

In this classification 8 is the value of $TP_{inf\ sys}$ in the documents, which are correctly classified by the Classifier (Analysis). The value of $FP_{inf\ sys}$ is 3 and $FN_{inf\ sys}$ is 2. This means 3 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified 2 documents that should have been classified in SCP class. 1 represents that document which doesn't belong to subclass and is being correctly classified as $TN_{inf\ sys}$ by both methods. P means Precision and R means Recall, there values are given as .72 and .8 respectively.

5.2.8 Logistic Management

Subclass: Logistic Management		Manual reading	
		Yes	No
Results by Classifier	Yes	8	3
	No	0	1

P	.72
R	1

In this classification 8 is the value of $TP_{log\ man}$ in the documents, which are correctly classified by the Classifier (Analysis). The value of $FP_{log\ man}$ is 3 and $FN_{log\ man}$ is 0. This means 3 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 1 represents that document which doesn't belong to subclass and is being correctly classified as $TN_{log\ man}$ by both methods. P means Precision and R means Recall, there values are given as .72 and .8 respectively.

5.2.9 Manufacturing Control Facility

Subclass: Manufacturing control Facility		Manual reading	
		Yes	No
Results by Classifier	Yes	8	2
	No	0	2

P	.8
R	1

In this classification 8 is the value of $TP_{man\ con\ fac}$ in the documents, which are correctly classified by the Classifier (Analysis). The value of $FP_{man\ con\ fac}$ is 2 and $FN_{man\ con\ fac}$ is 0. This means 2 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 2 represent those documents which don't belong to subclass

and is being correctly classified as $TN_{man\ con\ fac}$ by both methods. P means Precision and R means Recall, there values are given as .8 and 1 respectively.

5.3 Level 2-3

Strategic planning is further classified into

- Business Strategy for Supply chain
- Enterprise and site planning.

Tactical Planning is further classified into

- Manufacturing Planning and Scheduling
- Available to promise
- Inventory planning

5.3.1 Business Strategy for Supply Chain

Subclass: Business Strategy for Supply chain		Manual reading	
		Yes	No
Results by Classifier (analysis)	Yes	5	4
	No	1	1

P	.55
R	.83

In this classification 5 is the value of TP_{bssc} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{bssc} is 4 and FN_{bssc} is 1. This means 4 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified 1 document that should have been classified in SCP class. 1 represents that document which doesn't belong to subclass and is being correctly classified as TN_{bssc} by both methods. P means Precision and R means Recall, there values are given as .55 and .83 respectively.

5.3.2 Enterprise and Site Planning

Subclass: Enterprise and site planning		Manual reading	
		Yes	No
Results by Classifier	Yes	3	5
	No	0	2

P	.375
R	1

In this classification 3 is the value of TP_{esp} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{esp} is 5 and FN_{esp} is 0. This means 5 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 2 represent those documents which don't belong to subclass and is being correctly classified as TN_{esp} by both methods. P means Precision and R means Recall, there values are given as .375 and 1 respectively.

5.3.3 Manufacturing Planning and Schedule

Subclass: Manufacturing Planning and Schedule		Manual reading	
		Yes	No
Results by Classifier	Yes	2	1
	No	2	2

P	.666
R	.5

In this classification 2 is the value of TP_{esp} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{esp} is 1 and FN_{esp} is 2. This means 2 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified 1 document that should have been classified in SCP class. 2 represent those documents which don't belong to subclass and is being correctly classified as TN_{esp} by both methods. P means Precision and R means Recall, there values are given as .666 and .5 respectively.

5.3.4 Available to Promise

Subclass: Available to Promise		Manual reading	
		Yes	No
Results by Classifier	Yes	2	3
	No	0	2

P	.4
R	1

In this classification 2 is the value of TP_{atp} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{atp} is 3 and FN_{atp} is 0. This means 3 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 2 represent those documents which don't belong to subclass and is being

correctly classified as TN_{atp} by both methods. P means Precision and R means Recall, there values are given as .4 and 1 respectively.

5.3.5 Inventory Planning

Subclass: Inventory Planning		Manual reading	
		Yes	No
Results by Classifier (Analysis)	Yes	3	1
	No	1	2

P	.75
R	.75

In this classification 3 is the value of TP_{ip} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{ip} is 1 and FN_{ip} is 1. This means 1 document classified by classifier is in wrong class (doesn't represent class) and it has not classified 1 document that should have been classified in SCP class. 2 represent those documents which don't belong to subclass and is being correctly classified as TN_{ip} by both methods. P means Precision and R means Recall, there values are given as .75 and .75 respectively.

The documents, which are belonging to SCE, are already being classified up to level 2. There is Function that is to be run on subclasses of Level 2 for the required results.

The classifications are as follow: -

Assembly Plant Management

- Assembly System Management
- Assembly Line Management
- Assembly Integration

E-Commerce

- Enterprise Security
- Electronic Fund Transfer
- Network Based Commerce
- Web Commerce

- Online Shopping

Logistic Management

- Logistic Control
- Logistic Operation Management

Decision Support system

- Manufacturing Logistic Decision support system
- Best to do match
- Management Training System

Information Systems

- Inventory information system
- Freight Distribution System
- Supply chain network information system
- Asset Tracking system

Manufacturing Control Facility

- Manufacturing Control Station
- Manufacturing Monitoring

Miscellaneous is classified as Supply Chain Financial Management and Transportation Management is classified as Fleet Management. And inventory Management as Inventory control.

5.3.6 Assembly Line Management

Subclass: Assembly System Management		Manual reading	
		Yes	No
Results by Classifier (analysis)	Yes	11	7
	No	0	2

P	.61
R	1

In this classification 11 is the value of TP_{alm} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{alm} is 7 and FN_{alm} is 0. This means 7 documents classified by classifier are in wrong class (doesn't represent

class) and it has not classified any document that should have been classified in SCP class. 2 represent those documents which don't belong to subclass and is being correctly classified as TN_{alm} by both methods. P means Precision and R means Recall, there values are given as .61 and 1 respectively.

5.3.7 Electronic Fund Transfer

Subclass: Electronic Fund Transfer		Manual reading	
		Yes	No
Results by Classifier (Analysis)	Yes	11	13
	No	0	4

P	.45
R	1

In this classification 11 is the value of TP_{eft} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{eft} is 13 and FN_{eft} is 0. This means 13 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 4 represent those documents which don't belong to subclass and is being correctly classified as TN_{eft} by both methods. P means Precision and R means Recall, there values are given as .45 and 1 respectively.

5.3.8 Network Based Commerce

Subclass: Network based commerce		Manual reading	
		Yes	No
Results by Classifier (analysis)	Yes	13	8
	No	0	4

P	.619
R	1

In this classification 13 is the value of TP_{nbc} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{nbc} is 8 and FN_{nbc} is 0. This means 8 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 4 represent those documents which don't belong to subclass and is being correctly classified as TN_{nbc} by both methods. P means Precision and R means Recall, there values are given as .619 and 1 respectively.

5.3.9 Web commerce

Subclass: Web commerce		Manual reading	
		Yes	No
Results by Classifier (analysis)	Yes	3	4
	No	1	2

P	.43
R	.75

In this classification 3 is the value of TP_{wc} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{wc} is 4 and FN_{wc} is 1. This means 4 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified 1 document that should have been classified in SCP class. 2 represent those documents which don't belong to subclass and is being correctly classified as TN_{wc} by both methods. P means Precision and R means Recall, there values are given as .43 and .75 respectively.

5.3.10 Logistic Control

Subclass: logistic control		Manual reading	
		Yes	No
Results by Classifier (analysis)	Yes	2	0
	No	1	0

P	1
R	.66

In this classification 2 is the value of TP_{lc} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{lc} is 0 and FN_{lc} is 1. This means that classifier has not classified any document in wrong class (doesn't represent class) and it has not classified 1 document that should have been classified in SCP class. 0 represent that no document belongs to the subclass and is being correctly classified as TN_{lc} by both methods. P means Precision and R means Recall, there values are given as 1 and .66 respectively.

5.3.11 Logistic Operation Management

Subclass: logistic operation management		Manual reading	
		Yes	No
Results by Classifier (Analysis)	Yes	9	10
	No	0	2

P	.47
R	1

In this classification 9 is the value of TP_{lom} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{lom} is 10 and FN_{lom} is 0. This means 10 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 2 represent those documents which don't belong to subclass and is being correctly classified as TN_{lom} by both methods. P means Precision and R means Recall, there values are given as .47 and 1 respectively.

5.3.12 Manufacturing Control Station

Subclass: Manufacturing Control Station		Manual reading	
		Yes	No
Results by Classifier (Analysis)	Yes	7	0
	No	1	2

P	1
R	.875

In this classification 7 is the value of TP_{mcs} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{mcs} is 0 and FN_{mcs} is 1. This means that classifier has not classified any document in wrong class (doesn't represent class) and it has not classified 1 document that should have been classified in SCP class. 2 represent those documents which don't belong to subclass and is being correctly classified as TN_{mcs} by both methods. P means Precision and R means Recall, there values are given as 1 and .66 respectively.

5.3.13 Manufacturing Monitoring

Subclass: Manufacturing Monitoring		Manual reading	
		Yes	No
Results by Classifier (Analysis)	Yes	4	2
	No	1	0

P	.6666
R	.8

In this classification 4 is the value of TP_{mm} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{mm} is 2 and FN_{mm} is 1. This means 2 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified 1 document that should have been classified in SCP class. 0 represent that no document belongs to the subclass and is being correctly

classified as TN_{mm} by both methods. P means Precision and R means Recall, there values are given as .666 and .8 respectively.

5.3.14 Inventory Information System

Subclass: Inventory information system		Manual reading	
		Yes	No
Results by Classifier (Analysis)	Yes	6	4
	No	0	2

P	.6
R	1

In this classification 6 is the value of TP_{iis} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{iis} is 4 and FN_{iis} is 0. This means 4 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 2 represent those documents which don't belong to subclass and is being correctly classified as TN_{iis} by both methods. P means Precision and R means Recall, there values are given as .6 and 1 respectively.

5.3.15 Freight Distribution System

Subclass: Freight Distribution System		Manual reading	
		Yes	No
Results by Classifier (Analysis)	Yes	1	1
	No	2	0

P	.5
R	.3333

In this classification 1 is the value of TP_{fds} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{fds} is 1 and FN_{fds} is 2. This means 1 document classified by classifier is in wrong class (doesn't represent class) and it has not classified 2 documents that should have been classified in SCP class. 0 represent that no document belongs to the subclass and is being correctly classified as TN_{fds} by both methods. P means Precision and R means Recall, there values are given as .5 and .33 respectively.

5.3.16 Supply Chain Network Information System

Subclass: Supply chain network information system		Manual reading	
		Yes	No
Results by Classifier (analysis)	Yes	10	6
	No	0	2

P	.625
R	1

In this classification 10 is the value of TP_{scnis} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{scnis} is 6 and FN_{scnis} is 0. This means 6 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 2 represent those documents which don't belong to subclass and is being correctly classified as TN_{scnis} by both methods. P means Precision and R means Recall, there values are given as .625 and 1 respectively.

5.3.17 Asset Tracking System

Subclass: Asset tracking system		Manual reading	
		Yes	No
Results by Classifier (Analysis)	Yes	8	3
	No	0	1

P	.7272
R	1

In this classification 8 is the value of TP_{ats} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{ats} is 3 and FN_{ats} is 0. This means 3 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified any document that should have been classified in SCP class. 1 represents that document which doesn't belong to subclass and is being correctly classified as TN_{ats} by both methods. P means Precision and R means Recall, there values are given as .7272 and 1 respectively.

5.3.18 Best To Do Match

Subclass: Best to do match		Manual reading	
		Yes	No
Results by Classifier (Analysis)	Yes	10	13
	No	2	7

P	.43
R	.8333

In this classification 10 is the value of TP_{btm} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{btm} is 13 and FN_{btm} is 2. This means 13 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified 2 documents that should have been classified in SCP class. 7 represent those documents which don't belong to subclass and is being correctly classified as TN_{btm} by both methods. P means Precision and R means Recall, there values are given as .43 and .8333 respectively.

5.3.19 Management Training System

Subclass: Management Training System		Manual reading	
		Yes	No
Results by Classifier (Analysis)	Yes	6	9
	No	1	6

P	.4
R	.86

In this classification 6 is the value of TP_{mts} in the documents, which are correctly classified by the Classifier (Analysis). The value of FP_{mts} is 9 and FN_{mts} is 1. This means 9 documents classified by classifier are in wrong class (doesn't represent class) and it has not classified 1 document that should have been classified in SCP class. 6 represent those documents which don't belong to subclass and is being correctly classified as TN_{mts} by both methods. P means Precision and R means Recall, there values are given as .4 and .86 respectively.

CHAPTER 6

CONCLUSION AND SCOPE FOR FUTURE RESEARCH

Patent documents acts as a source of Technical and commercial knowledge. It assists the firm in the process of decision making in the field of research and development, predicting market trends and its progress. There are large numbers of patents available in field like supply chain management. Data mining provides tool to analyze these patent. In this thesis we have developed Discriminant function as a tool for Data Mining.

The method used in this thesis, takes in consideration the attributes present in the class which have larger function values as then assigned to the patent document. It assigns relative weight to the attribute, for a class used, based on these weights and frequency of occurrences for that attribute, calculating a value for these classes using discriminant function. We have seen that by using this metadata accuracy of method can be increased. We have identified a set of attributes, which can discriminant document in different classes. With the assistance of small manual sample, we have developed discriminant function for each class.

Scope for future Research and limitation

After analyzing results obtained by Discriminant function some observations which should be taken into consideration for further improving the classification are as follows:

- The number of keywords can be increased. As we go down in hierarchy of classification in lower level keywords becomes important in discriminating between subclasses.
- We have left citation as a attribute in future research. Citation can also included as a attribute in developing discriminating function.

- Different weighting criteria can be tested for making a better discriminating function.
- When in a subclass the number of documents is less (less sample size) the related discriminating function sometimes fail to classify documents appropriately.
- For initial classification where documents are being classified as relevant and non-relevant for the 0 level, function 2 can be used, which is a better discriminator between relevant and non-relevant documents.

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ANNEXURE A
A USPTO Patent Document

United States Patent **5,760,669**
Dangler , et al. **June 2, 1998**

Low profile inductor/transformer component

Abstract

A low profile, low cost, high performance inductor/transformer component having a wire coil within a core set which is disposed at least partially within a recess in a header. The header includes projections extending from it which form terminals when wire leads from the coil are wrapped around them.

Inventors: **Dangler; Willard K.** (Yankton, SD); **Bodenstedt; Steven R.** (Yankton, SD); **Waring; Bruce R.** (Yankton, SD)
Assignee: **Dale Electronics, Inc.** (Columbus, NE)
Appl. No.: **736333**
Filed: **October 23, 1996**
Current U.S. Class: 336/65; 336/83; 336/192; 336/212
Intern'l Class: H01F 027/06; H01F 027/29
Field of Search: 336/65,192,83,212

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Primary Examiner: Kozma; Thomas J.
Attorney, Agent or Firm: Zarley, McKee, Thomte, Voorhees, & Sease

Parent Case Text

This is a continuation of application Ser. No. 08/349,038 filed on Dec. 3, 1994, now abandoned.

Claims

What is claimed is:

1. A low profile electronic component comprising:

a header having a recess formed within said header, said header forming a plurality of projections extending from said header and being generally parallel to said header, said projections being formed from the same material as the header;

first and second opposing core members forming a core set, said core set being at least partially disposed within said recess;

a pre-wound coil disposed at least partially within said core set such that the pre-wound coil is insertable into the first core member and held in place by the second core member, said pre-wound coil having a plurality of wire leads; and at least one of said wire leads being wrapped around one of said projections to form a conductive surface on said projection to form a component terminal.

2. The low profile electronic component of claim 1 wherein said header and said core set are bonded together with an adhesive.

3. The low profile electronic component of claim 1 further comprising a layer of

solder disposed over at least a portion of said component terminal.

4. The low profile electronic component of claim 1 wherein said pre-wound coil is comprised of at least two wires electromagnetically coupled together to form a transformer.

5. The low profile electronic component of claim 1 wherein said pre-wound coil includes a wire coil to form an inductor.

6. The low profile electronic component of claim 1 wherein said projections extend outward generally parallel to said header allowing said component to form a surface mount component.

7. The low profile electronic component of claim 1 wherein said header is made from a plastic material capable of withstanding temperatures of at least 230.degree. C.

8. The electronic component of claim 1 wherein said first and second core members are made from a ferrite.

9. The low profile electronic component of claim 1 wherein said projections have a rectangular cross-section.

10. The low profile electronic component of claim 1 wherein said projections have an oval cross-section.

11. The low profile electronic component of claim 1 wherein said projections have a trapezoidal cross-section.

12. The low profile electronic component of claim 1 wherein said pre-wound coil is a self-supporting coil.

13. The low profile electronic component of claim 1 wherein said recess extends entirely through said header.

14. A low profile surface mount electronic component comprising:

a flat header having a top and bottom surface and a plurality of edges, said header having a recess formed in a said top surface;

a plurality of non-conductive projections extending from at least one of said edges of said header generally parallel to said bottom surface of said header, said projections being formed from the same material as the header;

first and second core members forming a core set, said core set being at least partially disposed within said recess, wherein the first core member has a first surface and the second core member has a second surface parallel to and facing the first surface,;

at least one self-supporting coil disposed at least partially within said core set between the first and second surfaces such that the combination of the first and second surfaces secure the self-supporting coil in place, each of said at least one self-supporting coils

having at least one wire lead; and

at least one of said wire leads being wrapped around one of said projections to form a conductive surface on said projection in order to form a surface mount terminal for the component.

15. The low profile surface mount electronic component of claim 14 further comprising a layer of solder disposed on said conductive surface.

16. The low profile surface mount electronic component of claim 14 wherein each of said projections is positioned perpendicular to the edge from which it extends.

17. The low profile surface mount electronic component of claim 16 wherein said projections are parallel to said bottom surface.

18. The low profile surface mount electronic component of claim 14 wherein at least one of the core members defines an outer surface of the component.

ANNEXURE B
A EPO Patent Document

trough with retractable wheels

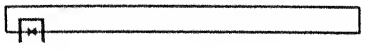
patent number: gb2405311
publication date: 2005-03-02
inventor: vaughan thomas richard [gb]
applicant: vaughan thomas richard [gb]
classification:
- international:

what does a1, a2, a3 and b stand for after an ep publication number in the "also published as" list?

what is a cited document?

why do i sometimes find the abstract of a corresponding document?

what is a mosaic?



ANNEXURE C

Attributes Keyword Abstract and Ratio 3 Calculation

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Allocation	4	sce	283	0.34382		
Allocation	2	sc p	74	0.65618		
Allocation policy	2	sc p	74	1		
Assembly line	2	sce	283	1		
Automatically	14	sce	283	0.42282		
Automatically	5	sc p	74	0.57718		
Automatically	2	sc e	46	0.15187	E-commerce: -	
Automatically	3	sc e	57	0.18384	Decision support system: -	
Automatically	3	sc e	46	0.22781	Information system: -	
Automatically	2	sc e	16	0.43663	Manufacturing control facility: -	
Automatically	2	scp	16	0.4	Tactical planning: -	
BRO	26	sce	283	0.77275		
BRO	2	sc p	74	0.22725		
BRO	3	sc e	24	0.33115	Assembly plant management: -	
BRO	8	sc e	46	0.46072	E-commerce: -	
BRO	2	sc e	57	0.09295	Decision support system: -	
BRO	2	sc e	46	0.11518	Information system: -	
BRO	2	E com	3	0.25	sc e	Web commerce: -
BRO	2	Ass p mar	14	0.66667	sc e	Assembly line management: -
Business process	6	sce	283	1		
Computer implemented	9	sce	283	0.08604		
Computer implemented	25	sc p	74	0.91406		
Computer implemented	5	sc e	57	0.36582	Decision support system: -	
Computer implemented	2	sc e	23	0.36264	Logistic management: -	
Computer implemented	3	sc e	46	0.27198	Information system: -	
Computer implemented	10	scp	20	0.8	Strategic planning	
Computer implemented	2	scp	16	0.2	Tactical planning: -	
Computer implemented	2	log man	15	1	sc e	Logistic operation management: -
Computer implemented	2	inf sys	12	0.66667	sc e	Asset tracking system: -
Computer implemented	10	s p	17	1	sc p	Enterprise and site planning: -
Computer implemented	2	t p	7	1	sc p	Manufacturing planning and scheduling
Consumer	19	sce	283	0.50103		
Consumer	5	sc p	74	0.49897		
Consumer	2	sc e	24	0.32408	Assembly plant management: -	
Consumer	5	sc e	46	0.42271	E-commerce: -	
Consumer	3	sc e	46	0.25363	Information system: -	
Consumer	2	scp	16	0.4	Tactical planning: -	
Consumer	2	E com	12	0.4	sc e	Electronic fund transfer: -
Consumer	2	Ass p mar	14	1	sc e	Assembly line management: -
Container	9	sce	283	0.54012		
Container	2	sc p	74	0.45902		
Container	3	sc e	24	0.33333	Assembly plant management: -	
Container	3	Ass p mar	14	1	sc e	Assembly line management: -
Customer	2	sc e	23	0.14034	Logistic management: -	
Customer	35	sce	283	0.60625		
Customer	6	sc p	74	0.39746		
Customer	5	sc e	24	0.33623	Assembly plant management: -	
Customer	7	sc e	46	0.2456	E-commerce: -	
Customer	3	sc e	57	0.08494	Decision support system: -	
Customer	4	sc e	46	0.14034	Information system: -	
Customer	4	scp	16	0.66667	Tactical planning: -	
Customer	2	inv man	6	0.5	sc e	Inventory control: -
Customer	2	log man	15	1	sc e	Logistic operation management: -
Customer	3	t p	3	0.75	sc p	Available to promise: -
Customer	5	Ass p mar	14	1	sc e	Assembly line management: -
Customer	4	sc e	14	0.46112	Inventory management: -	

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Customer order	3	sce	283	1		
Data	140	sce	283	0.5185		
Data	34	sc p	74	0.4815		
Data	5	sc e	24	0.04868	Assembly plant management: -	
Data	26	sc e	46	0.13207	E-commerce: -	
Data	14	sc e	23	0.14223	Logistic management: -	
Data	5	sc e	12	0.09736	Transportation management: -	
Data	29	sc e	57	0.11888	Decision support system: -	
Data	25	sc e	46	0.12699	Information system: -	
Data	8	sc e	16	0.11683	Manufacturing control facility: -	
Data	2	sc e	4	0.11683	Miscellaneous: -	
Data	10	scp	20	0.4	Strategic planning	
Data	6	scp	16	0.3	Tactical planning: -	
Data	2	inv man	6	0.33333	sc e	Inventory control: -
Data	4	E com	5	0.2945	sc e	Enterprise security: -
Data	4	E com	8	0.18406	sc e	Network based commerce: -
Data	3	E com	3	0.36812	sc e	Web commerce: -
Data	5	Tr Man	12	1	sc e	Fleet management: -
Data	3	log man	4	0.50581	sc e	Logistic control: -
Data	11	log man	15	0.49457	sc e	Logistic operation management: -
Data	2	dss	5	0.23731	sc e	Manufacturing logistic decision suppor
Data	3	dss	4	0.44496	sc e	Best-to-do-match: -
Data	4	dss	9	0.26368	sc e	Management training system: -
Data	4	inf sys	7	0.46318	sc e	Supply chain network information syste
Data	8	inf sys	12	0.54038	sc e	Asset tracking system: -
Data	3	man con f	9	0.375	sc e	Manufacturing control station: -
Data	5	man con f	9	0.625	sc e	Manufacturing monitoring: -
Data	2	mis	3	1	sc e	Supply chain financial model: -
Data	10	s p	17	1	sc p	Enterprise and site planning: -
Data	3	t p	7	0.11715	sc p	Manufacturing planning and scheduling
Data	3	t p	1	0.82005	sc p	Product development: -
Data	2	t p	4	0.0628	sc p	Inventory planning: -
Data	3	o p	7	1	sc p	Production scheduling: -
Data	5	E com	12	0.15338	sc e	Electronic fund transfer: -
Data	4	Ass p mar	14	0.8	sc e	Assembly line management: -
Data	3	scp	8	0.3	Operational planning: -	
Data	6	sc e	14	0.10014	Inventory management: -	
Data element	5	sce	283	1		
Data element	2	sc e	46	0.4	E-commerce: -	
Decision support syste	5	sce	283	1		
Decision support syste	3	sc e	57	0.6	Decision support system: -	
Demand	28	sce	283	0.37894		
Demand	12	sc p	74	0.62107		
Demand	4	sc e	46	0.16264	E-commerce: -	
Demand	5	sc e	57	0.16407	Decision support system: -	
Demand	3	sc e	23	0.24396	Logistic management: -	
Demand	4	sc e	46	0.16264	Information system: -	
Demand	2	scp	20	0.15094	Strategic planning	
Demand	3	scp	16	0.28302	Tactical planning: -	
Demand	2	dss	4	0.4	sc e	Best-to-do-match: -
Demand	2	inf sys	6	0.5	sc e	Inventory information system: -
Demand	2	s p	17	1	sc p	Enterprise and site planning: -
Demand	2	t p	1	0.5	sc p	Product development: -
Demand	2	t p	4	0.5	sc p	Inventory planning: -
Demand	2	o p	7	0.66667	sc p	Production scheduling: -
Demand	2	E com	12	0.5	sc e	Electronic fund transfer: -
Demand	3	scp	8	0.09179	Operational planning: -	
Demand	2	sc e	14	0.26719	Inventory management: -	
Display	49	sce	283	0.81289		

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Display	3	sc p	74	0.19033		
Display	2	sc e	24	0.0652	Assembly plant management: -	
Display	4	sc e	23	0.13607	Logistic management: -	
Display	9	sc e	46	0.15308	E-commerce: -	
Display	3	sc e	12	0.1956	Transportation management: -	
Display	9	sc e	57	0.12354	Decision support system: -	
Display	4	sc e	46	0.06804	Information system: -	
Display	3	sc e	16	0.1467	Manufacturing control facility: -	
Display	2	E com	4	0.22222	sc e	Online shopping: -
Display	3	Tr Man	12	1	sc e	Fleet management: -
Display	3	dss	9	0.33333	sc e	Management training system: -
Display	3	man con f	9	1	sc e	Manufacturing control station: -
Display	2	Ass p mar	14	1	sc e	Assembly line management: -
Display	2	sc e	14	0.11177	Inventory management: -	
E business	5	sce	283	0.03046		
E business	3	sc p	74	0.0699		
E business	2	sc e	46	0.4	E-commerce: -	
E business	2	scp	20	0.6	Strategic planning	
E business	2	s p	3	1	sc p	Business strategy: -
EAS	99	sce	283	0.54069		
EAS	22	sc p	74	0.4595		
EAS	10	sc e	24	0.14146	Assembly plant management: -	
EAS	9	sc e	23	0.13285	Logistic management: -	
EAS	11	sc e	46	0.08118	E-commerce: -	
EAS	5	sc e	12	0.14146	Transportation management: -	
EAS	22	sc e	57	0.13103	Decision support system: -	
EAS	14	sc e	46	0.10333	Information system: -	
EAS	7	sc e	16	0.14853	Manufacturing control facility: -	
EAS	6	scp	20	0.48985	Strategic planning	
EAS	5	scp	16	0.51026	Tactical planning: -	
EAS	3	inv man	6	0.6	sc e	Inventory control: -
EAS	3	Ass p mar	5	0.58333	sc e	Assembly system management: -
EAS	2	E com	4	0.63055	sc e	Online shopping: -
EAS	5	Tr Man	12	1	sc e	Fleet management: -
EAS	6	log man	15	0.66666	sc e	Logistic operation management: -
EAS	3	dss	5	0.33959	sc e	Manufacturing logistic decision suppor
EAS	2	dss	4	0.28299	sc e	Best-to-do-match: -
EAS	6	dss	9	0.37732	sc e	Management training system: -
EAS	3	inf sys	6	0.44764	sc e	Inventory information system: -
EAS	2	inf sys	7	0.2558	sc e	Supply chain network information syste
EAS	4	inf sys	12	0.29843	sc e	Asset tracking system: -
EAS	6	man con f	9	0.85714	sc e	Manufacturing control station: -
EAS	6	s p	17	1	sc p	Enterprise and site planning: -
EAS	3	t p	7	0.6	sc p	Manufacturing planning and scheduling
EAS	3	E com	12	0.31528	sc e	Electronic fund transfer: -
EAS	6	Ass p mar	14	0.41667	sc e	Assembly line management: -
EAS	5	sc e	14	0.04242	Inventory management: -	
Electronic commerce	6	sce	283	1		
Electronic commerce	4	sc e	46	0.66667	E-commerce: -	
Electronic commerce	2	E com	12	0.5	sc e	Electronic fund transfer: -
Enabling access	7	sce	283	1		
Enabling access	2	sc e	46	0.47303	E-commerce: -	
Enabling access	2	sc e	57	0.38174	Decision support system: -	
Enterprise	16	sce	283	0.19768		
Enterprise	17	sc p	74	0.80325		
Enterprise	5	sc e	46	0.3125	E-commerce: -	
Enterprise	7	scp	20	0.41176	Strategic planning	
Enterprise	7	s p	17	1	sc p	Enterprise and site planning: -
Firewall	4	sce	283	1		

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Firewall	2	sc e	46	0.5	E-commerce: -	
Firewall	2	E com	5	1	sc e	Enterprise security: -
Forecast	11	sce	283	0.17048		
Forecast	14	sc p	74	0.82978		
Forecast	2	sc e	46	0.23352	E-commerce: -	
Forecast	6	scp	16	0.42857	Tactical planning: -	
Forecast	2	t p	3	0.3333	sc p	Available to promise: -
Forecast	4	t p	4	0.66666	sc p	Inventory planning: -
Forecast	2	sc e	14	0.76729	Inventory management: -	
Forecasting	7	sce	283	0.23379		
Forecasting	6	sc p	74	0.76636		
Forecasting	2	scp	16	0.33333	Tactical planning: -	
Forecasting	2	t p	4	1	sc p	Inventory planning: -
Forecasting	2	sc e	14	0.28571	Inventory management: -	
Graphical user interfac	5	sce	283	1		
GUI	13	sce	283	1		
GUI	2	sc e	12	0.59479	Transportation management: -	
GUI	4	sc e	57	0.25044	Decision support system: -	
GUI	2	sc e	46	0.15516	Information system: -	
GUI	2	Tr Man	12	1	sc e	Fleet management: -
HTML	12	sce	283	1		
HTML	3	sc e	46	0.4537	E-commerce: -	
HTML	2	sc e	57	0.2441	Decision support system: -	
HTML	2	sc e	46	0.30247	Information system: -	
Information	105	sce	283	0.63164		
Information	16	sc p	74	0.36809		
Information	6	sc e	24	0.07571	Assembly plant management: -	
Information	20	sc e	46	0.13167	E-commerce: -	
Information	8	sc e	23	0.10533	Logistic management: -	
Information	3	sc e	12	0.07571	Transportation management: -	
Information	19	sc e	57	0.10095	Decision support system: -	
Information	19	sc e	46	0.12508	Information system: -	
Information	5	sc e	16	0.09464	Manufacturing control facility: -	
Information	3	sc e	4	0.22713	Miscellaneous: -	
Information	7	scp	20	0.73916	Strategic planning	
Information	2	scp	16	0.26398	Tactical planning: -	
Information	3	E com	8	0.27251	sc e	Network based commerce: -
Information	2	E com	4	0.36335	sc e	Online shopping: -
Information	3	Tr Man	12	1	sc e	Fleet management: -
Information	6	log man	15	0.75	sc e	Logistic operation management: -
Information	2	dss	9	0.10526	sc e	Management training system: -
Information	3	inf sys	7	0.63268	sc e	Supply chain network information syste
Information	3	inf sys	12	0.36906	sc e	Asset tracking system: -
Information	4	man con f	9	0.75	sc e	Manufacturing monitoring: -
Information	2	mis	3	0.666	sc e	Supply chain financial model: -
Information	6	s p	17	0.85714	sc p	Enterprise and site planning: -
Information	6	E com	12	0.36335	sc e	Electronic fund transfer: -
Information	4	Ass p mar	14	0.6666	sc e	Assembly line management: -
Information	3	sc e	14	0.06489	Inventory management: -	
Inventory	42	sce	283	0.6874		
Inventory	5	sc p	74	0.31296		
Inventory	3	sc e	24	0.09464	Assembly plant management: -	
Inventory	4	sc e	23	0.13167	Logistic management: -	
Inventory	2	sc e	46	0.03292	E-commerce: -	
Inventory	8	sc e	57	0.10626	Decision support system: -	
Inventory	9	sc e	46	0.14813	Information system: -	
Inventory	2	scp	16	0.4	Tactical planning: -	
Inventory	2	inv man	6	0.22222	sc e	Inventory control: -
Inventory	2	E com	4	1	sc e	Online shopping: -

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Inventory	3	inf sys	6	0.66667	sc e	Inventory information system: -
Inventory	3	inf sys	12	0.33333	sc e	Asset tracking system: -
Inventory	3	Ass p mar	14	1	sc e	Assembly line management: -
Inventory	9	sc e	14	0.4867	Inventory management: -	
Inventory management	12	sce	283	0.61099		
Inventory management	2	sc p	74	0.38944		
Inventory management	2	sc e	57	0.08053	Decision support system: -	
Inventory management	2	sc e	46	0.09979	Information system: -	
Inventory management	2	inf sys	12	1	sc e	Asset tracking system: -
Inventory management	5	sc e	14	0.81972	Inventory management: -	
IPA	16	sce	283	1		
IPA	8	sc e	46	0.83227	E-commerce: -	
IPA	2	sc e	57	0.16792	Decision support system: -	
IPA	2	dss	9	1	sc e	Management training system: -
IPA	6	E com	12	0.75	sc e	Electronic fund transfer: -
Item tracking	4	sce	283	1		
Item tracking	2	sc e	57	0.44661	Decision support system: -	
Item tracking	2	sc e	46	0.5534	Information system: -	
Item tracking	2	inf sys	12	1	sc e	Asset tracking system: -
Location	40	sce	283	0.59916		
Location	7	sc p	74	0.40099		
Location	2	sc e	24	0.06091	Assembly plant management: -	
Location	8	sc e	46	0.12711	E-commerce: -	
Location	7	sc e	23	0.22244	Logistic management: -	
Location	2	sc e	12	0.12181	Transportation management: -	
Location	6	sc e	57	0.07694	Decision support system: -	
Location	9	sc e	46	0.143	Information system: -	
Location	2	sc e	16	0.09136	Manufacturing control facility: -	
Location	3	scp	16	0.42857	Tactical planning: -	
Location	2	Tr Man	12	1	sc e	Fleet management: -
Location	5	log man	15	0.71429	sc e	Logistic operation management: -
Location	5	inf sys	12	0.55556	sc e	Asset tracking system: -
Location	3	E com	12	0.375	sc e	Electronic fund transfer: -
Location	2	Ass p mar	14	1	sc e	Assembly line management: -
Location	3	sc e	14	0.15662	Inventory management: -	
Management functions	4	sce	283	1		
Management functions	2	sc e	57	0.44665	Decision support system: -	
Management functions	2	sc e	46	0.55345	Information system: -	
Management functions	2	inf sys	12	1	sc e	Asset tracking system: -
Management system	19	sce	283	1		
Management system	3	sc e	46	0.1786	E-commerce: -	
Management system	4	sc e	57	0.19218	Decision support system: -	
Management system	4	sc e	46	0.23813	Information system: -	
Management system	2	sc e	14	0.39122	Inventory management: -	
Material requirement p	2	sc p	74	1		
MRP	3	sc p	74	1		
MRP	2	scp	16	0.6	Tactical planning: -	
MRP	2	t p	7	1	sc p	Manufacturing planning and scheduling
Network	66	sce	283	0.55238		
Network	14	sc p	74	0.4481		
Network	2	sc e	24	0.06497	Assembly plant management: -	
Network	22	sc e	46	0.37286	E-commerce: -	
Network	10	sc e	57	0.13677	Decision support system: -	
Network	2	sc e	23	0.06779	Logistic management: -	
Network	8	sc e	46	0.13559	Information system: -	
Network	4	scp	20	0.34786	Strategic planning	
Network	2	scp	16	0.21741	Tactical planning: -	
Network	3	inv man	6	0.75	sc e	Inventory control: -
Network	3	E com	5	0.22727	sc e	Enterprise security: -

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Network	5	E com	8	0.23674	sc e	Network based commerce: -
Network	2	E com	3	0.25253	sc e	Web commerce: -
Network	3	E com	4	0.28409	sc e	Online shopping: -
Network	2	dss	9	0.2	sc e	Management training system: -
Network	4	inf sys	7	0.5	sc e	Supply chain network information syste
Network	3	s p	17	0.75	sc p	Enterprise and site planning: -
Network	7	E com	12	0.31818	sc e	Electronic fund transfer: -
Network	2	scp	8	0.43482	Operational planning: -	
Network	4	sc e	14	0.22275	Inventory management: -	
Networks	6	sce	283	1		
Networks	3	sc e	46	0.5	E-commerce: -	
Networks	2	E com	12	0.666	sc e	Electronic fund transfer: -
Node	7	sce	283	0.16942		
Node	9	sc p	74	0.83302		
Node	3	sc e	46	0.45381	E-commerce: -	
Node	2	sc e	57	0.24416	Decision support system: -	
Node	2	sc e	46	0.30254	Information system: -	
Node	4	scp	20	0.44444	Strategic planning	
Node	2	inf sys	7	1	sc e	Supply chain network information syste
Node	4	s p	17	1	sc p	Enterprise and site planning: -
Node	2	E com	12	0.6666	sc e	Electronic fund transfer: -
Operation	38	sce	283	0.66804		
Operation	5	sc p	74	0.33616		
Operation	5	sc e	24	0.15152	Assembly plant management: -	
Operation	6	sc e	46	0.09486	E-commerce: -	
Operation	2	sc e	23	0.06324	Logistic management: -	
Operation	2	sc e	12	0.12121	Transportation management: -	
Operation	3	sc e	57	0.03828	Decision support system: -	
Operation	2	sc e	46	0.03162	Information system: -	
Operation	3	sc e	16	0.13637	Manufacturing control facility: -	
Operation	2	sc e	4	0.36364	Miscellaneous: -	
Operation	2	Tr Man	12	1	sc e	Fleet management: -
Operation	2	dss	5	0.6666	sc e	Manufacturing logistic decision suppor
Operation	3	man con f	9	0.6006	sc e	Manufacturing control station: -
Operation	2	man con f	9	0.4004	sc e	Manufacturing monitoring: -
Operation	2	mis	3	1	sc e	Supply chain financial model: -
Operation	2	o p	7	1	sc p	Production scheduling: -
Operation	2	E com	12	0.3333	sc e	Electronic fund transfer: -
Operation	4	Ass p mar	14	0.8	sc e	Assembly line management: -
Operation	2	scp	8	0.4	Operational planning: -	
Order for	6	sce	283	1		
Over a network	9	sce	283	1		
Over a network	2	sc e	46	0.5535	E-commerce: -	
Over a network	2	sc e	57	0.44669	Decision support system: -	
Packaging	7	sce	283	1		
Packaging	4	sc e	24	0.57143	Assembly plant management: -	
Packaging	4	Ass p mar	14	1	sc e	Assembly line management: -
Performance	27	sce	283	0.64031		
Performance	4	sc p	74	0.36278		
Performance	2	sc e	24	0.10613	Assembly plant management: -	
Performance	2	sc e	23	0.11075	Logistic management: -	
Performance	2	sc e	46	0.05537	E-commerce: -	
Performance	6	sc e	57	0.13406	Decision support system: -	
Performance	3	sc e	46	0.08306	Information system: -	
Performance	3	sc e	16	0.23879	Manufacturing control facility: -	
Performance	2	inv man	6	0.666	sc e	Inventory control: -
Performance	2	man con f	9	0.6666	sc e	Manufacturing control station: -
Performance	2	Ass p mar	14	1	sc e	Assembly line management: -
Performance	3	sc e	14	0.27291	Inventory management: -	

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Planning engine	3	sc p	74	1		
Planning engine	2	scp	20	0.6666	Strategic planning	
Planning engine	2	s p	17	1	sc p	Enterprise and site planning: -
Product information	10	sce	283	1		
Product information	3	sc e	46	0.5	E-commerce: -	
Product information	3	sc e	46	0.5	Information system: -	
Purchase	20	sce	283	1		
Purchase	6	sc e	46	0.56615	E-commerce: -	
Purchase	2	sc e	57	0.1523	Decision support system: -	
Purchase	3	sc e	46	0.28308	Information system: -	
Purchase	2	E com	4	0.66667	sc e	Online shopping: -
Purchase	3	E com	12	0.33333	sc e	Electronic fund transfer: -
Purchase order	4	sce	283	1		
Recording	2	sce	283	1		
Replenishment	12	sce	283	1		
Replenishment	3	sc e	57	0.15852	Decision support system: -	
Replenishment	3	sc e	46	0.19643	Information system: -	
Replenishment	2	inf sys	12	0.666	sc e	Asset tracking system: -
Replenishment	3	sc e	14	0.63434	Inventory management: -	
RFID	6	sce	283	1		
RFID	3	sc e	57	0.21199	Decision support system: -	
RFID	3	sc e	23	0.52538	Logistic management: -	
RFID	3	sc e	46	0.26269	Information system: -	
RFID	3	log man	15	1	sc e	Logistic operation management: -
RFID	3	inf sys	12	1	sc e	Asset tracking system: -
Schedule	19	sce	283	0.29318		
Schedule	12	sc p	74	0.70813		
Schedule	3	sc e	24	0.30928	Assembly plant management: -	
Schedule	6	sc e	57	0.26044	Decision support system: -	
Schedule	2	sc e	23	0.21515	Logistic management: -	
Schedule	4	sc e	46	0.21515	Information system: -	
Schedule	4	scp	16	0.40043	Tactical planning: -	
Schedule	2	inf sys	12	0.5	sc e	Asset tracking system: -
Schedule	2	t p	7	0.08698	sc p	Manufacturing planning and scheduling
Schedule	3	t p	1	0.91324	sc p	Product development: -
Schedule	3	Ass p mar	14	1	sc e	Assembly line management: -
Schedule	3	scp	8	0.60065	Operational planning: -	
Scheduling	4	sce	283	0.13087		
Scheduling	7	sc p	74	0.87588		
Scheduling	2	scp	16	0.2	Tactical planning: -	
Scheduling	4	scp	8	0.80002	Operational planning: -	
Scheduling system	3	sc p	74			
Scheduling system	2	o p	7	1	sc p	Production scheduling: -
Scheduling system	2	scp	8		Operational planning: -	
Ship	26	sce	283	0.69601		
Ship	3	sc p	74	0.30713		
Ship	3	sc e	24	0.35994	Assembly plant management: -	
Ship	3	sc e	46	0.1878	E-commerce: -	
Ship	4	sc e	57	0.20207	Decision support system: -	
Ship	4	sc e	46	0.25039	Information system: -	
Ship	2	Ass p mar	14	0.66666	sc e	Assembly line management: -
Shipment	6	sce	283	1		
Shipment	2	sc e	24	0.33333	Assembly plant management: -	
Shipment	2	Ass p mar	14	1	sc e	Assembly line management: -
Simulation	7	sce	283	0.47843		
Simulation	2	sc p	74	0.52277		
Simulation	3	sc e	57	0.42857	Decision support system: -	
Simulation	2	dss	9	0.66666	sc e	Management training system: -
Supplier	16	sce	283	0.5048		

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Supplier	2	sc e	23	0.21663	Logistic management: -	
Supplier	4	sc p	74	0.48263		
Supplier	2	sc e	57	0.08741	Decision support system: -	
Supplier	3	sc e	46	0.16247	Information system: -	
Supplier	2	scp	16	0.5	Tactical planning: -	
Supplier	2	log man	4	1	sc e	Logistic control: -
Supplier	3	sc e	14	0.53383	Inventory management: -	
Supply chain	40	sce	283	0.51211		
Supply chain	10	sc p	74	0.48962		
Supply chain	3	sc e	24	0.08219	Assembly plant management: -	
Supply chain	3	sc e	23	0.08576	Logistic management: -	
Supply chain	6	sc e	46	0.08576	E-commerce: -	
Supply chain	9	sc e	57	0.10382	Decision support system: -	
Supply chain	6	sc e	46	0.08576	Information system: -	
Supply chain	3	sc e	4	0.49315	Miscellaneous: -	
Supply chain	4	scp	20	0.4	Strategic planning	
Supply chain	3	E com	8	0.61828	sc e	Network based commerce: -
Supply chain	2	E com	3	0.38232	sc e	E-commerce system: -
Supply chain	2	log man	15	0.66666	sc e	Logistic operation management: -
Supply chain	2	inf sys	7	0.63163	sc e	Supply chain network information syste
Supply chain	2	inf sys	12	0.36845	sc e	Asset tracking system: -
Supply chain	2	mis	3	0.6666	sc e	Supply chain financial model: -
Supply chain	4	s p	17	1	sc p	Enterprise and site planning: -
Supply chain	3	Ass p mar	14	1	sc e	Assembly line management: -
Supplying	2	sce	283	1		
Time period	8	sce	283	0.51397		
Time period	2	sc p	74	0.4914		
Time period	2	sc e	23	0.43386	Logistic management: -	
Time period	4	sc e	57	0.35013	Decision support system: -	
Time period	2	sc e	46	0.21693	Information system: -	
Time period	2	log man	15	1	sc e	Logistic operation management: -
Time period	2	inf sys	12	1	sc e	Asset tracking system: -
Tracking system	8	sce	283	1		
Tracking system	4	sc e	57	0.2441	Decision support system: -	
Tracking system	3	sc e	23	0.4537	Logistic management: -	
Tracking system	4	sc e	46	0.30247	Information system: -	
Tracking system	3	log man	15	1	sc e	Logistic operation management: -
Tracking system	4	inf sys	12	1	sc e	Asset tracking system: -
Transportation	8	sce	283	0.41088		
Transportation	3	sc p	74	0.58925		
Transportation	3	sc e	12	0.375	Transportation management: -	
Transportation	3	Tr Man	12	1	sc e	Fleet management: -
Vehicle	23	sce	283	1		
Vehicle	7	sc e	12	0.58024	Transportation management: -	
Vehicle	6	sc e	23	0.25949	Logistic management: -	
Vehicle	3	sc e	57	0.05235	Decision support system: -	
Vehicle	5	sc e	46	0.10812	Information system: -	
Vehicle	7	Tr Man	12	1	sc e	Fleet management: -
Vehicle	4	log man	15	0.6666	sc e	Logistic operation management: -
Vehicle	2	inf sys	6	0.57144	sce	Freight distribution system: -
Vehicle	3	inf sys	12	0.42858	sc e	Asset tracking system: -
Warehouse	5	sce	283	1		
Warehouse	2	sc e	24	0.4	Assembly plant management: -	
Warehouse	2	Ass p mar	14	1	sc e	Assembly line management: -
Web browser	14	sce	283	1		
Web browser	5	sc e	46	0.75766	E-commerce: -	
Web browser	2	sc e	57	0.24458	Decision support system: -	
Web browser	2	E com	3	0.4	sc e	Web commerce: -
World Wide Web	5	sce	283	1		

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
World Wide Web	3	sc e	46	0.6	E-commerce: -	

ANNEXURE D

Attributes Keyword Title and Ratio 3 Calculation

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Allocation	4	sce	283	0.34382		
BRO	3	sce	283	0.65618		
Computer implemented	5	sc p	74	1		
Computer implemented	2	scp	20	1	Strategic planning	
Computer implemented	2	s p	17	0.42282	sc p	Enterprise and site planning: -
Consumer	6	sce	283	0.57718		
Consumer	5	sc p	74	0.15187		
Consumer	2	sc e	46	0.18384	E-commerce: -	
Consumer	2	sc e	46	0.22781	Information system: -	
Consumer	2	scp	16	0.43663	Tactical planning: -	
Container	4	sce	283	0.4		
Container	2	sc e	24	0.77275	Assembly plant management: -	
Container	2	Ass p man	14	0.22725	sc e	Assembly line management: -
Customer	3	sce	283	0.33115		
Customer	2	sc e	24	0.46072	Assembly plant management: -	
Customer	2	Ass p man	14	0.09295	sc e	Assembly line management: -
Data	28	sce	283	0.11518		
Data	2	sc p	74	0.25		
Data	8	sc e	46	0.66667	E-commerce: -	
Data	2	sc e	12	1	Transportation management: -	
Data	5	sc e	57	0.08604	Decision support system: -	
Data	3	sc e	46	0.91406	Information system: -	
Data	2	sc e	16	0.36582	Manufacturing control facility: -	
Data	2	Tr Man	12	0.36264	sc e	Fleet management: -
Data	2	inf sys	7	0.27198	sc e	Supply chain network information system
Data	2	man con fa	9	0.8	sc e	Manufacturing control station: -
Decision support syster	8	sce	283	0.2		
Decision support syster	6	sc e	57	1	Decision support system: -	
Decision support syster	2	dss	9	0.66667	sc e	Management training system: -
Demand	2	sce	283	1		
Demand	4	sc p	74	1		
Demand	2	scp	16	0.50103	Tactical planning: -	
Display	4	sce	283	0.49897		
Display	2	sc p	74	0.32408		
Display	3	sc e	57	0.42271	Decision support system: -	
Enterprise	4	sce	283	0.25363		
Enterprise	12	sc p	74	0.4		
Enterprise	6	scp	20	0.4	Strategic planning	
Enterprise	6	s p	17	1	sc p	Enterprise and site planning: -
Forecast	4	sce	283	0.54012		
Forecast	4	sc p	74	0.45902		
Forecast	2	sc e	14	0.33333	Inventory management: -	
Forecast	2	scp	16	1	Tactical planning: -	
Forecast	2	t p	4	0.14034	sc p	Inventory planning: -
Forecasting	2	sce	283	0.60625		
Forecasting	2	sc p	74	0.39746		
Graphical user interfac	2	sce	283	0.33623		
HTML	7	sce	283	0.2456		
HTML	2	sc e	46	0.08494	Information system: -	
Information	23	sce	283	0.14034		
Information	2	sc p	74	0.66667		
Information	2	sc e	24	0.5	Assembly plant management: -	

KEYWORDS USED	No. of documen t(Having keyword s)	Subclass	Total no. of documen ts	Weight	Subclass	Subclass
Information	4	sc e	46	1	E-commerce: -	
Information	2	sc e	23	0.75	Logistic management: -	
Information	5	sc e	57	1	Decision support system: -	
Information	6	sc e	46	0.46112	Information system: -	
Information	2	Ass p man	14	1	sc e	Assembly line management: -
Inventory	20	sce	283	0.5185		
Inventory	3	sc p	74	0.4815		
Inventory	8	sc e	14	0.04868	Inventory management: -	
Inventory	3	sc e	46	0.13207	E-commerce: -	
Inventory	4	sc e	23	0.14223	Logistic management: -	
Inventory	3	sc e	57	0.09736	Decision support system: -	
Inventory	3	sc e	46	0.11888	Information system: -	
Inventory	3	inv man	6	0.12699	sc e	Inventory control: -
Inventory	3	E com	4	0.11683	sc e	Online shopping: -
Inventory	2	inf sys	12	0.11683	sc e	Asset tracking system: -
Inventory control	9	sce	283	0.4		
Inventory control	3	sc e	14	0.3	Inventory management: -	
Inventory control	3	sc e	46	0.33333	E-commerce: -	
Inventory control	3	sc e	23	0.2945	Logistic management: -	
Inventory control	3	inv man	6	0.18406	sc e	Inventory control: -
Inventory control	3	E com	4	0.36812	sc e	Online shopping: -
Inventory management	6	sce	283	1		
Inventory management	3	sc p	74	0.50581		
Inventory management	2	sc e	14	0.49457	Inventory management: -	
Inventory management	2	sc e	57	0.23731	Decision support system: -	
Inventory management	2	sc e	46	0.44496	Information system: -	
Inventory management	2	inf sys	12	0.26368	sc e	Asset tracking system: -
Item tracking	4	sce	283	0.46318		
Item tracking	2	sc e	57	0.54038	Decision support system: -	
Item tracking	2	sc e	46	0.375	Information system: -	
Item tracking	2	inf sys	12	0.625	sc e	Asset tracking system: -
Location	4	sce	283	1		
Management system	11	sce	283	1		
Management system	3	sc e	57	0.11715	Decision support system: -	
Network	25	sce	283	0.82005		
Network	2	sc p	74	0.0628		
Network	2	sc e	14	1	Inventory management: -	
Network	10	sc e	46	0.15338	E-commerce: -	
Network	2	sc e	23	0.8	Logistic management: -	
Network	4	sc e	57	0.3	Decision support system: -	
Network	4	sc e	46	0.10014	Information system: -	
Network	2	sc e	16	1	Manufacturing control facility: -	
Network	2	scp	20	0.4	Strategic planning	
Network	2	inv man	6	1	sc e	Inventory control: -
Network	4	E com	12	0.6	sc e	Electronic fund transfer: -
Network	3	E com	8	0.37894	sc e	Network based commerce: -
Network	2	E com	4	0.62107	sc e	Online shopping: -
Network	4	inf sys	7	0.16264	sc e	Supply chain network information system
Networks	2	sce	283	0.16407		
Operation	6	sce	283	0.24396		
Operation	2	sc e	24	0.16264	Assembly plant management: -	
Packaging	7	sce	283	0.15094		
Packaging	4	sc e	24	0.28302	Assembly plant management: -	
Packaging	4	Ass p man	14	0.4	sc e	Assembly line management: -
Product information	3	sce	283	0.5		

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Purchase	5	sce	283	1		
Purchase	2	sc e	46	0.5	E-commerce: -	
Purchase order	2	sce	283	0.5		
Replenishment	4	sce	283	0.66667		
Schedule	2	sce	283	0.5		
Schedule	2	sc p	74	0.09179		
Scheduling	2	sce	283	0.26719		
Scheduling	6	sc p	74	0.81289		
Scheduling	4	scp	8	0.19033	Operational planning: -	
Scheduling	4	o p	7	0.0652	sc p	Production scheduling: -
Scheduling system	4	sc p	74	0.13607		
Scheduling system	3	scp	8	0.15308	Operational planning: -	
Scheduling system	3	o p	7	0.1956	sc p	Production scheduling: -
Ship	2	sce	283	0.12354		
Shipment	2	sce	283	0.06804		
Simulation	4	sce	283	0.1467		
Simulation	2	sc e	57	0.22222	Decision support system: -	
Simulation	2	dss	9	1	sc e	Management training system: -
Supplier	3	sce	283	0.33333		
Supplier	2	sc e	46	1	Information system: -	
Supply chain	20	sce	283	1		
Supply chain	6	sc e	46	0.11177	E-commerce: -	
Supply chain	2	sc e	23	0.03046	Logistic management: -	
Supply chain	2	sc e	57	0.0699	Decision support system: -	
Supply chain	3	sc e	4	0.4	Miscellaneous: -	
Supply chain	4	E com	8	0.6	sc e	Network based commerce: -
Supply chain	2	E com	3	1	sc e	E-commerce system: -
Supply chain	2	log man	4	0.54069	sc e	Logistic control: -
Supply chain	2	mis	3	0.4595	sc e	Supply chain financial model: -
Tracking system	4	sce	283	0.14146		
Tracking system	2	sc e	57	0.13285	Decision support system: -	
Tracking system	2	sc e	46	0.08118	Information system: -	
Tracking system	2	inf sys	12	0.14146	sc e	Asset tracking system: -
Transportation	2	sce	283	0.13103		
Vehicle	12	sce	283	0.10333		
Vehicle	4	sc e	12	0.14853	Transportation management: -	
Vehicle	3	sc e	23	0.48985	Logistic management: -	
Vehicle	4	Tr Man	12	0.51026	sc e	Fleet management: -
Vehicle	2	log man	15	0.6	sc e	Logistic operation management: -
Web server	10	sce	283	0.58333		
Web server	3	sc e	46	0.63055	E-commerce: -	
Web server	2	sc e	57	1	Decision support system: -	
World Wide Web	3	sce	283	0.66666		

ANNEXURE E

Attributes Keyword Claim and Ratio 3 Calculation

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Allocation	6	sc e	283	0.16397		
Allocation	8	sc p	74	0.8361		
Allocation	2	sc e	24	0.33333	Assembly plant management: -	
Allocation	4	scp	16	0.5	Tactical planning: -	
Allocation	2	Ass p mai	14	1	sc e	Assembly line management: -
Allocation	2	t p	7	0.30004	sc p	Manufacturing planning and schedulin
Allocation	2	t p	3	0.7001	sc p	Available to promise: -
Allocation policy	4	sc p	74	1		
Allocation policy	2	scp	16	0.5	Tactical planning: -	
Allocation policy	2	t p	3	1	sc p	Available to promise: -
Allocation value	4	sc p	74	1		
Allocation value	2	scp	16	0.5	Tactical planning: -	
Allocation value	2	t p	3	1	sc p	Available to promise: -
Assembly line	8	sce	283	1		
Assembly line	3	sc e	24	0.375	Assembly plant management: -	
Assembly line	3	Ass p mai	14	1	sc e	Assembly line management: -
Automatically	26	sce	283	0.53136		
Automatically	6	sc p	74	0.46895		
Automatically	2	sc e	14	0.20263	Inventory management: -	
Automatically	6	sc e	24	0.35459	Assembly plant management: -	
Automatically	4	sc e	46	0.12334	E-commerce: -	
Automatically	2	sc e	57	0.04977	Decision support system: -	
Automatically	3	sc e	46	0.0925	Information system: -	
Automatically	2	sc e	16	0.1773	Manufacturing control facility: -	
Automatically	2	scp	16	0.33333	Tactical planning: -	
Automatically	2	inv man	6	1	sc e	Inventory control: -
Automatically	4	Ass p mai	14	0.66667	sc e	Assembly line management: -
Automatically	2	t p	7	1	sc p	Manufacturing planning and schedulin
Bar code	11	sce	283	1		
Bar code	2	sc e	24	0.40605	Assembly plant management: -	
Bar code	2	sc e	46	0.21185	E-commerce: -	
Bar code	2	sc e	57	0.17097	Decision support system: -	
Bar code	2	sc e	46	0.21185	Information system: -	
Bar code	2	Ass p mai	14	1	sc e	Assembly line management: -
BRO	27	sce	283	0.43966		
BRO	9	sc p	74	0.56047		
BRO	3	sc e	24	0.20219	Assembly plant management: -	
BRO	7	sc e	46	0.24614	E-commerce: -	
BRO	2	sc e	12	0.26959	Transportation management: -	
BRO	5	sc e	57	0.14189	Decision support system: -	
BRO	4	sc e	46	0.14065	Information system: -	
BRO	2	scp	20	0.28572	Strategic planning	
BRO	2	scp	8	0.71431	Operational planning: -	
BRO	3	Ass p mai	14	1	sc e	Assembly line management: -
BRO	3	E com	8	0.35938	sc e	Network based commerce: -
BRO	2	E com	3	0.6389	sc e	Web commerce: -
BRO	2	Tr Man	12	1	sc e	Fleet management: -
BRO	2	inf sys	12	0.5	sc e	Asset tracking system: -
BRO	2	s p	17	1	sc p	Enterprise and site planning: -
BRO	2	o p	7	1	sc p	Production scheduling: -
Business process	4	sce	283	1		

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Computer implemente	14	sce	283	0.19623		
Computer implemente	15	sc p	74	0.80406		
Computer implemente	2	sc e	23	0.33803	Logistic management: -	
Computer implemente	6	sc e	57	0.4092	Decision support system: -	
Computer implemente	3	sc e	46	0.25352	Information system: -	
Computer implemente	6	scp	20	0.70611	Strategic planning	
Computer implemente	2	scp	16	0.29421	Tactical planning: -	
Computer implemente	2	log man	15	1	sc e	Logistic operation management: -
Computer implemente	2	inf sys	12	0.66666	sc e	Asset tracking system: -
Computer implemente	6	s p	17	1	sc p	Enterprise and site planning: -
Consumer	16	sce	283	0.58286		
Consumer	3	sc p	74	0.41794		
Consumer	2	sc e	24	0.23307	Assembly plant management: -	
Consumer	3	sc e	46	0.18241	E-commerce: -	
Consumer	2	sc e	23	0.24321	Logistic management: -	
Consumer	2	sc e	57	0.09814	Decision support system: -	
Consumer	4	sc e	46	0.24321	Information system: -	
Consumer	2	Ass p mar	14	1	sc e	Assembly line management: -
Container	21	sce	283	0.7347		
Container	2	sc p	74	0.26759		
Container	7	sc e	24	0.43707	Assembly plant management: -	
Container	2	sc e	12	0.24975	Transportation management: -	
Container	3	sc e	23	0.19546	Logistic management: -	
Container	2	sc e	57	0.05258	Decision support system: -	
Container	2	sc e	46	0.06515	Information system: -	
Container	2	Ass p mar	5	0.52951	sc e	Assembly system management: -
Container	5	Ass p mar	14	0.47278	sc e	Assembly line management: -
Container	2	Tr Man	12	1	sc e	Fleet management: -
Container	2	log man	4	0.66667	sc e	Logistic control: -
Customer	29	sce	283	0.48797		
Customer	8	sc p	74	0.5148		
Customer	3	sc e	14	0.264	Inventory management: -	
Customer	2	sc e	24	0.10267	Assembly plant management: -	
Customer	5	sc e	46	0.13391	E-commerce: -	
Customer	4	sc e	23	0.21426	Logistic management: -	
Customer	7	sc e	57	0.1513	Decision support system: -	
Customer	5	sc e	46	0.13391	Information system: -	
Customer	4	scp	16	0.5	Tactical planning: -	
Customer	2	Ass p mar	14	1	sc e	Assembly line management: -
Customer	2	E com	3	0.4	sc e	E-commerce system: -
Customer	2	log man	4	0.68371	sc e	Logistic control: -
Customer	3	log man	15	0.27348	sc e	Logistic operation management: -
Customer	3	t p	3	0.75	sc p	Available to promise: -
Customer order	5	sce	283	0.20737		
Customer order	5	sc p	74	0.79305		
Customer order	2	sc e	24	0.4	Assembly plant management: -	
Customer order	3	scp	16	0.6	Tactical planning: -	
Customer order	2	Ass p mar	14	1	sc e	Assembly line management: -
Customer order	3	t p	3	1	sc p	Available to promise: -
Data	150	sce	283	0.47703		
Data	43	sc p	74	0.52297		
Data	4	sc e	14	0.06546	Inventory management: -	
Data	6	sc e	24	0.05728	Assembly plant management: -	
Data	27	sc e	46	0.13447	E-commerce: -	

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Data	4	sc e	12	0.07637	Transportation management: -	
Data	9	sc e	23	0.08965	Logistic management: -	
Data	34	sc e	57	0.13666	Decision support system: -	
Data	28	sc e	46	0.13945	Information system: -	
Data	9	sc e	16	0.12887	Manufacturing control facility: -	
Data	3	sc e	4	0.17183	Miscellaneous: -	
Data	11	scp	20	0.30562	Strategic planning	
Data	8	scp	16	0.27784	Tactical planning: -	
Data	6	scp	8	0.41676	Operational planning: -	
Data	2	inv man	6	0.5	sc e	Inventory control: -
Data	5	Ass p mar	14	0.83333	sc e	Assembly line management: -
Data	3	E com	5	0.18606	sc e	Enterprise security: -
Data	4	E com	12	0.10337	sc e	Electronic fund transfer: -
Data	5	E com	8	0.19381	sc e	Network based commerce: -
Data	3	E com	3	0.3101	sc e	Web commerce: -
Data	2	E com	3	0.20674	sc e	E-commerce system: -
Data	4	Tr Man	12	1	sc e	Fleet management: -
Data	2	log man	4	0.48401	sc e	Logistic control: -
Data	8	log man	15	0.51627	sc e	Logistic operation management: -
Data	2	dss	5	0.23455	sc e	Manufacturing logistic decision suppo
Data	3	dss	4	0.43979	sc e	Best-to-do-match: -
Data	5	dss	9	0.32577	sc e	Management training system: -
Data	3	inf sys	6	0.29572	sc e	Inventory information system: -
Data	6	inf sys	7	0.50695	sc e	Supply chain network information syst
Data	4	inf sys	12	0.19715	sc e	Asset tracking system: -
Data	5	man con f	9	0.50008	sc e	Manufacturing control station: -
Data	5	man con f	9	0.50008	sc e	Manufacturing monitoring: -
Data	2	mis	3	0.66666	sc e	Supply chain financial model: -
Data	3	s p	3	0.60809	sc p	Business strategy: -
Data	11	s p	17	0.39347	sc p	Enterprise and site planning: -
Data	4	t p	7	0.46157	sc p	Manufacturing planning and schedulin
Data	2	t p	3	0.5385	sc p	Available to promise: -
Data	5	o p	7	0.83333	sc p	Production scheduling: -
Data element	7	sce	283	0.23379		
Data element	6	sc p	74	0.76636		
Data element	2	sc e	24	0.28571	Assembly plant management: -	
Data element	2	scp	20	0.33333	Strategic planning	
Data element	2	Ass p mar	14	1	sc e	Assembly line management: -
Data element	2	s p	17	1	sc p	Enterprise and site planning: -
Database server	11	sce	283	1		
Database server	2	sc e	24	0.48937	Assembly plant management: -	
Database server	2	sc e	46	0.25532	E-commerce: -	
Database server	2	sc e	46	0.25532	Information system: -	
Database server	2	Ass p mar	14	1	sc e	Assembly line management: -
Decision support syste	8	sce	283	1		
Decision support syste	5	sc e	57	0.625	Decision support system: -	
Demand	22	sce	283	0.30678		
Demand	13	sc p	74	0.69327		
Demand	2	sc e	14	0.24	Inventory management: -	
Demand	2	sc e	24	0.14	Assembly plant management: -	
Demand	2	sc e	46	0.07304	E-commerce: -	
Demand	2	sc e	23	0.14609	Logistic management: -	
Demand	4	sc e	57	0.11789	Decision support system: -	
Demand	2	sc e	46	0.07304	Information system: -	

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Demand	2	sc e	16	0.21	Manufacturing control facility: -	
Demand	2	scp	20	0.15071	Strategic planning	
Demand	3	scp	16	0.28258	Tactical planning: -	
Demand	3	scp	8	0.56516	Operational planning: -	
Demand	2	Ass p mar	14	1	sc e	Assembly line management: -
Demand	2	dss	4	0.5	sc e	Best-to-do-match: -
Demand	2	man con f	9	0.5	sc e	Manufacturing control station: -
Demand	2	man con f	9	0.5	sc e	Manufacturing monitoring: -
Demand	2	s p	3	0.85034	sc p	Business strategy: -
Demand	2	s p	17	0.15006	sc p	Enterprise and site planning: -
Demand	3	o p	7	1	sc p	Production scheduling: -
Display	69	sce	283	0.56257		
Display	14	sc p	74	0.43652		
Display	6	sc e	24	0.14027	Assembly plant management: -	
Display	9	sc e	46	0.10978	E-commerce: -	
Display	3	sc e	12	0.14027	Transportation management: -	
Display	5	sc e	23	0.12197	Logistic management: -	
Display	17	sc e	57	0.16734	Decision support system: -	
Display	12	sc e	46	0.14637	Information system: -	
Display	5	sc e	16	0.17534	Manufacturing control facility: -	
Display	3	scp	20	0.32436	Strategic planning	
Display	5	scp	16	0.67574	Tactical planning: -	
Display	5	Ass p mar	14	0.83333	sc e	Assembly line management: -
Display	2	E com	8	0.22222	sc e	Network based commerce: -
Display	3	Tr Man	12	1	sc e	Fleet management: -
Display	2	log man	15	0.4	sc e	Logistic operation management: -
Display	4	dss	9	0.23529	sc e	Management training system: -
Display	4	inf sys	7	0.77429	sc e	Supply chain network information syst
Display	2	inf sys	12	0.22584	sc e	Asset tracking system: -
Display	3	man con f	9	0.60026	sc e	Manufacturing control station: -
Display	2	man con f	9	0.40018	sc e	Manufacturing monitoring: -
Display	2	t p	7	0.4	sc p	Manufacturing planning and schedulin
E business	5	sce	283	0.40154		
E business	2	sc p	74	0.61425		
E business	2	sc e	46	0.4	E-commerce: -	
EAS	166	sce	283	0.51454		
EAS	41	sc p	74	0.48601		
EAS	9	sc e	14	0.11963	Inventory management: -	
EAS	15	sc e	24	0.11631	Assembly plant management: -	
EAS	23	sc e	46	0.09305	E-commerce: -	
EAS	7	sc e	12	0.10856	Transportation management: -	
EAS	14	sc e	23	0.11328	Logistic management: -	
EAS	35	sc e	57	0.11427	Decision support system: -	
EAS	28	sc e	46	0.11328	Information system: -	
EAS	10	sc e	16	0.12314	Manufacturing control facility: -	
EAS	2	sc e	4	0.09851	Miscellaneous: -	
EAS	12	scp	20	0.37602	Strategic planning	
EAS	10	scp	16	0.39168	Tactical planning: -	
EAS	3	scp	8	0.23501	Operational planning: -	
EAS	4	inv man	6	0.44444	sc e	Inventory control: -
EAS	2	Ass p mar	5	0.24787	sc e	Assembly system management: -
EAS	10	Ass p mar	14	0.44262	sc e	Assembly line management: -
EAS	2	Ass p mar	4	0.30984	sc e	Assembly integration: -
EAS	3	E com	5	0.14575	sc e	Enterprise security: -

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
EAS	5	E com	12	0.14575	sc e	Electronic fund transfer: -
EAS	2	E com	8	0.06073	sc e	Network based commerce: -
EAS	2	E com	3	0.16195	sc e	Web commerce: -
EAS	2	E com	2	0.24292	sc e	M commerce: -
EAS	3	E com	3	0.24292	sc e	E-commerce system: -
EAS	7	Tr Man	12	1	sc e	Fleet management: -
EAS	3	log man	4	0.55753	sc e	Logistic control: -
EAS	9	log man	15	0.44602	sc e	Logistic operation management: -
EAS	3	dss	5	0.28241	sc e	Manufacturing logistic decision suppo
EAS	3	dss	4	0.35301	sc e	Best-to-do-match: -
EAS	7	dss	9	0.36609	sc e	Management training system: -
EAS	4	inf sys	6	0.27319	sc e	Inventory information system: -
EAS	2	inf sys	6	0.1366	sce	Freight distribution system: -
EAS	6	inf sys	7	0.35125	sc e	Supply chain network information syst
EAS	7	inf sys	12	0.23905	sc e	Asset tracking system: -
EAS	6	man con f	9	0.6	sc e	Manufacturing control station: -
EAS	4	man con f	9	0.4	sc e	Manufacturing monitoring: -
EAS	3	s p	3	0.65617	sc p	Business strategy: -
EAS	9	s p	17	0.34738	sc p	Enterprise and site planning: -
EAS	5	t p	7	0.30004	sc p	Manufacturing planning and schedulin
EAS	2	t p	3	0.28004	sc p	Supply chain planning: -
EAS	3	t p	3	0.42006	sc p	Available to promise: -
EAS	3	o p	7	1	sc p	Production scheduling: -
Electronic commerce	6	sce	283	1		
Electronic commerce	4	sc e	46	0.66666	E-commerce: -	
Enabling access	5	sce	283	0.39614		
Enabling access	2	sc p	74	0.60599		
Enabling access	2	sc e	46	0.4	E-commerce: -	
Enterprise	9	sce	283	0.11564		
Enterprise	18	sc p	74	0.88452		
Enterprise	2	sc e	46	0.01133	E-commerce: -	
Enterprise	2	sc e	57	0.00914	Decision support system: -	
Enterprise	2	sc e	46	0.01133	Information system: -	
Enterprise	8	scp	20	0.44444	Strategic planning	
Enterprise	2	E com	8	1	sc e	Network based commerce: -
Enterprise	8	s p	17	1	sc p	Enterprise and site planning: -
Firewall	2	sce	283	0.20731		
Firewall	2	sc p	74	0.79281		
Forecast	17	sce	283	0.20728		
Forecast	17	sc p	74	0.79272		
Forecast	3	sc e	14	0.36549	Inventory management: -	
Forecast	2	sc e	24	0.14214	Assembly plant management: -	
Forecast	2	sc e	12	0.28427	Transportation management: -	
Forecast	2	sc e	23	0.14832	Logistic management: -	
Forecast	2	sc e	57	0.05985	Decision support system: -	
Forecast	4	scp	20	0.34824	Strategic planning	
Forecast	6	scp	16	0.65294	Tactical planning: -	
Forecast	2	inv man	6	0.66667	sc e	Inventory control: -
Forecast	2	Ass p mar	14	1	sc e	Assembly line management: -
Forecast	2	Tr Man	12	1	sc e	Fleet management: -
Forecast	3	s p	17	0.75	sc p	Enterprise and site planning: -
Forecast	3	t p	3	0.66666	sc p	Available to promise: -
Forecasting	11	sce	283	0.29137		
Forecasting	7	sc p	74	0.7091		

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Forecasting	2	sc e	14	0.63259	Inventory management: -	
Forecasting	2	sc e	24	0.36901	Assembly plant management: -	
Forecasting	2	scp	20	0.44455	Strategic planning	
Forecasting	2	scp	16	0.55569	Tactical planning: -	
Forecasting	2	Ass p ma	14	1	sc e	Assembly line management: -
Graphical user interfac	11	sce	283	1		
Graphical user interfac	2	sc e	46	0.40006	E-commerce: -	
Graphical user interfac	3	sc e	46	0.60009	Information system: -	
GUI	14	sce	283	0.54967		
GUI	3	sc p	74	0.45045		
GUI	2	sc e	24	0.25484	Assembly plant management: -	
GUI	2	sc e	23	0.26592	Logistic management: -	
GUI	4	sc e	57	0.21461	Decision support system: -	
GUI	4	sc e	46	0.26592	Information system: -	
GUI	2	scp	20	0.6666	Strategic planning	
GUI	2	Ass p ma	14	1	sc e	Assembly line management: -
GUI	2	log man	15	1	sc e	Logistic operation management: -
GUI	2	s p	17	1	sc p	Enterprise and site planning: -
HTML	8	sce	283	1		
HTML	2	sc e	46	0.35628	E-commerce: -	
HTML	2	sc e	57	0.28752	Decision support system: -	
HTML	2	sc e	46	0.35628	Information system: -	
Information	123	sce	283	0.59457		
Information	22	sc p	74	0.4067		
Information	8	sc e	14	0.15077	Inventory management: -	
Information	8	sc e	24	0.08795	Assembly plant management: -	
Information	19	sc e	46	0.10898	E-commerce: -	
Information	2	sc e	12	0.04398	Transportation management: -	
Information	10	sc e	23	0.11472	Logistic management: -	
Information	27	sc e	57	0.12498	Decision support system: -	
Information	27	sc e	46	0.15487	Information system: -	
Information	5	sc e	16	0.08245	Manufacturing control facility: -	
Information	2	sc e	4	0.13193	Miscellaneous: -	
Information	8	scp	20	0.47881	Strategic planning	
Information	3	scp	16	0.22444	Tactical planning: -	
Information	2	scp	8	0.29926	Operational planning: -	
Information	2	inv man	6	0.25	sc e	Inventory control: -
Information	7	Ass p ma	14	0.875	sc e	Assembly line management: -
Information	3	E com	12	0.40004	sc e	Electronic fund transfer: -
Information	3	E com	8	0.60006	sc e	Network based commerce: -
Information	2	Tr Man	12	1	sc e	Fleet management: -
Information	8	log man	15	0.8	sc e	Logistic operation management: -
Information	2	dss	4	0.69444	sc e	Best-to-do-match: -
Information	2	dss	9	0.30864	sc e	Management training system: -
Information	3	inf sys	6	0.25203	sc e	Inventory information system: -
Information	2	inf sys	6	0.16802	sce	Freight distribution system: -
Information	4	inf sys	7	0.28803	sc e	Supply chain network information syst
Information	7	inf sys	12	0.29403	sc e	Asset tracking system: -
Information	2	man con t	9	0.33385	sc e	Manufacturing control station: -
Information	4	man con t	9	0.66771	sc e	Manufacturing monitoring: -
Information	2	s p	3	0.6182	sc p	Business strategy: -
Information	7	s p	17	0.38183	sc p	Enterprise and site planning: -
Information	2	t p	7	0.30002	sc p	Manufacturing planning and schedulin
Information	2	t p	3	0.70005	sc p	Supply chain planning: -

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Information	2	o p	7	1	sc p	Production scheduling: -
Inventory	40	sce	283	0.53948		
Inventory	9	sc p	74	0.4642		
Inventory	10	sc e	14	0.4836	Inventory management: -	
Inventory	2	sc e	24	0.05642	Assembly plant management: -	
Inventory	5	sc e	46	0.07359	E-commerce: -	
Inventory	5	sc e	23	0.14718	Logistic management: -	
Inventory	9	sc e	57	0.1069	Decision support system: -	
Inventory	9	sc e	46	0.13246	Information system: -	
Inventory	3	scp	16	0.42943	Tactical planning: -	
Inventory	2	scp	8	0.57258	Operational planning: -	
Inventory	4	inv man	6	0.4	sc e	Inventory control: -
Inventory	2	Ass p mar	14	1	sc e	Assembly line management: -
Inventory	3	log man	15	0.6	sc e	Logistic operation management: -
Inventory	3	inf sys	6	0.60131	sc e	Inventory information system: -
Inventory	4	inf sys	12	0.40087	sc e	Asset tracking system: -
Inventory control	3	sce	283	0.28651		
Inventory control	2	sc p	74	0.73046		
Inventory management	7	sce	283	1		
Inventory management	2	sc e	14	0.80282	Inventory management: -	
Inventory management	2	sc e	57	0.19718	Decision support system: -	
IPA	10	sce	283	0.46574		
IPA	3	sc p	74	0.53434		
IPA	2	sc e	24	0.70377	Assembly plant management: -	
IPA	2	sc e	57	0.29632	Decision support system: -	
IPA	2	Ass p mar	14	1	sc e	Assembly line management: -
Item tracking	6	sce	283	1		
Item tracking	2	sc e	23	0.42502	Logistic management: -	
Item tracking	3	sc e	57	0.25725	Decision support system: -	
Item tracking	3	sc e	46	0.31877	Information system: -	
Item tracking	2	log man	15	1	sc e	Logistic operation management: -
Item tracking	3	inf sys	12	1	sc e	Asset tracking system: -
Location	64	sce	283	0.54494		
Location	14	sc p	74	0.45588		
Location	4	sc e	14	0.12985	Inventory management: -	
Location	8	sc e	24	0.15149	Assembly plant management: -	
Location	8	sc e	46	0.07904	E-commerce: -	
Location	4	sc e	12	0.15149	Transportation management: -	
Location	11	sc e	23	0.21735	Logistic management: -	
Location	12	sc e	57	0.09568	Decision support system: -	
Location	12	sc e	46	0.11855	Information system: -	
Location	2	sc e	16	0.05681	Manufacturing control facility: -	
Location	5	scp	16	0.55616	Tactical planning: -	
Location	2	scp	8	0.44493	Operational planning: -	
Location	7	Ass p mar	14	0.875	sc e	Assembly line management: -
Location	4	Tr Man	12	1	sc e	Fleet management: -
Location	2	log man	4	0.5173	sc e	Logistic control: -
Location	7	log man	15	0.48281	sc e	Logistic operation management: -
Location	2	inf sys	6	0.36404	sc e	Inventory information system: -
Location	7	inf sys	12	0.63707	sc e	Asset tracking system: -
Location	2	t p	7	0.30075	sc p	Manufacturing planning and schedulin
Location	2	t p	3	0.70175	sc p	Available to promise: -
Location	2	o p	7	1	sc p	Production scheduling: -
Management functions	2	sce	283	1		

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Management system	13	sce	283	1		
Management system	5	sc e	57	0.57362	Decision support system: -	
Management system	3	sc e	46	0.42647	Information system: -	
Material requirement p	2	sc p	74	1		
MRP	4	sce	283	0.25887		
MRP	3	sc p	74	0.7425		
MRP	2	scp	16	0.75	Tactical planning: -	
MRP	2	t p	7	1	sc p	Manufacturing planning and schedulin
Network	64	sce	283	0.54494		
Network	14	sc p	74	0.45588		
Network	5	sc e	14	0.18958	Inventory management: -	
Network	4	sc e	24	0.08847	Assembly plant management: -	
Network	20	sc e	46	0.2308	E-commerce: -	
Network	3	sc e	23	0.06924	Logistic management: -	
Network	7	sc e	57	0.06519	Decision support system: -	
Network	8	sc e	46	0.09232	Information system: -	
Network	2	sc e	4	0.26542	Miscellaneous: -	
Network	6	scp	20	0.42857	Strategic planning	
Network	2	inv man	6	0.4	sc e	Inventory control: -
Network	2	Ass p mar	14	0.22148	sc e	Assembly line management: -
Network	2	Ass p mar	4	0.77519	sc e	Assembly integration: -
Network	2	E com	5	0.27753	sc e	Enterprise security: -
Network	5	E com	12	0.28909	sc e	Electronic fund transfer: -
Network	5	E com	8	0.43363	sc e	Network based commerce: -
Network	2	inf sys	7	0.25	sc e	Supply chain network information syst
Network	4	s p	17	0.6666	sc p	Enterprise and site planning: -
Networks	6	sce	283	0.4417		
Networks	2	sc p	74	0.56306		
Networks	3	sc e	46	0.5	E-commerce: -	
Node	8	sce	283	0.173		
Node	10	sc p	74	0.82702		
Node	2	sc e	46	0.25	E-commerce: -	
Node	5	scp	20	0.5	Strategic planning	
Node	4	s p	17	0.8	sc p	Enterprise and site planning: -
Operation	40	sce	283	0.44588		
Operation	13	sc p	74	0.55418		
Operation	3	sc e	14	0.16551	Inventory management: -	
Operation	3	sc e	24	0.09655	Assembly plant management: -	
Operation	3	sc e	46	0.05037	E-commerce: -	
Operation	2	sc e	12	0.12873	Transportation management: -	
Operation	3	sc e	23	0.10075	Logistic management: -	
Operation	5	sc e	57	0.06775	Decision support system: -	
Operation	6	sc e	46	0.10075	Information system: -	
Operation	6	sc e	16	0.28964	Manufacturing control facility: -	
Operation	4	scp	20	0.44471	Strategic planning	
Operation	2	scp	8	0.55589	Operational planning: -	
Operation	3	Ass p mar	14	1	sc e	Assembly line management: -
Operation	2	E com	12	0.6666	sc e	Electronic fund transfer: -
Operation	2	Tr Man	12	1	sc e	Fleet management: -
Operation	2	log man	15	0.666	sc e	Logistic operation management: -
Operation	3	inf sys	6	0.5	sce	Freight distribution system: -
Operation	3	man con t	9	0.42941	sc e	Manufacturing control station: -
Operation	4	man con t	9	0.57255	sc e	Manufacturing monitoring: -
Operation	3	s p	17	0.75	sc p	Enterprise and site planning: -

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Operation	2	o p	7	1	sc p	Production scheduling: -
Order for	14	sce	283	1		
Order for	4	sc e	24	0.53733	Assembly plant management: -	
Order for	3	sc e	46	0.21026	E-commerce: -	
Order for	2	sc e	57	0.11312	Decision support system: -	
Order for	2	sc e	46	0.14017	Information system: -	
Order for	3	Ass p mar	14	0.75	sc e	Assembly line management: -
Order for	2	inf sys	6	1	sc e	Inventory information system: -
Over a network	5	sce	283	1		
Over a network	2	sc e	46	0.4	E-commerce: -	
Over a network	2	E com	8	1	sc e	Network based commerce: -
Packaging	6	sce	283	1		
Packaging	2	sc e	24	0.70377	Assembly plant management: -	
Packaging	2	sc e	57	0.29632	Decision support system: -	
Packaging	2	Ass p mar	14	1	sc e	Assembly line management: -
Performance	29	sce	283	0.7913		
Performance	2	sc p	74	0.2087		
Performance	3	sc e	14	0.25296	Inventory management: -	
Performance	2	sc e	24	0.09837	Assembly plant management: -	
Performance	4	sc e	46	0.10265	E-commerce: -	
Performance	2	sc e	23	0.10265	Logistic management: -	
Performance	7	sc e	57	0.14497	Decision support system: -	
Performance	3	sc e	46	0.07699	Information system: -	
Performance	3	sc e	16	0.22134	Manufacturing control facility: -	
Performance	3	inv man	6	1	sc e	Inventory control: -
Performance	2	Ass p mar	14	1	sc e	Assembly line management: -
Performance	2	E com	8	0.5	sc e	Network based commerce: -
Performance	2	inf sys	6	0.666	sc e	Inventory information system: -
Performance	2	man con f	9	0.666	sc e	Manufacturing control station: -
Planning engine	9	sc p	74	1		
Planning engine	5	scp	20	0.55556	Strategic planning	
Planning engine	5	s p	17	1	sc p	Enterprise and site planning: -
Product information	7	sce	283	1		
Product information	2	sc e	46	0.50079	E-commerce: -	
Product information	2	sc e	46	0.50079	Information system: -	
Purchase	29	sce	283	0.65478		
Purchase	4	sc p	74	0.34539		
Purchase	3	sc e	14	0.27624	Inventory management: -	
Purchase	8	sc e	46	0.22419	E-commerce: -	
Purchase	3	sc e	23	0.16815	Logistic management: -	
Purchase	6	sc e	57	0.1357	Decision support system: -	
Purchase	7	sc e	46	0.19617	Information system: -	
Purchase	2	log man	15	0.666	sc e	Logistic operation management: -
Purchase	2	inf sys	6	0.28571	sc e	Inventory information system: -
Purchase order	10	sce	283	1		
Purchase order	2	sc e	46	0.18872	E-commerce: -	
Purchase order	2	sc e	23	0.37743	Logistic management: -	
Purchase order	2	sc e	57	0.1523	Decision support system: -	
Purchase order	3	sc e	46	0.28308	Information system: -	
Purchase order	2	log man	15	1	sc e	Logistic operation management: -
Recording	10	sce	283	1		
Recording	2	sc e	24	0.27712	Assembly plant management: -	
Recording	2	sc e	46	0.14459	E-commerce: -	
Recording	3	sc e	23	0.43376	Logistic management: -	

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Recording	2	sc e	46	0.14459	Information system: -	
Recording	2	Ass p mar	14	1	sc e	Assembly line management: -
Recording	3	log man	15	1	sc e	Logistic operation management: -
Replenishment	4	sce	283	1		
RFID	4	sce	283	1		
RFID	2	sc e	23	0.52535	Logistic management: -	
RFID	2	sc e	57	0.21198	Decision support system: -	
RFID	2	sc e	46	0.26267	Information system: -	
RFID	2	log man	15	1	sc e	Logistic operation management: -
RFID	2	inf sys	12	1	sc e	Asset tracking system: -
Schedule	20	sce	283	0.30357		
Schedule	12	sc p	74	0.69657		
Schedule	4	sc e	24	0.3235	Assembly plant management: -	
Schedule	2	sc e	46	0.08439	E-commerce: -	
Schedule	3	sc e	23	0.25318	Logistic management: -	
Schedule	5	sc e	57	0.17026	Decision support system: -	
Schedule	4	sc e	46	0.16878	Information system: -	
Schedule	4	scp	16	0.33154	Tactical planning: -	
Schedule	4	scp	8	0.66308	Operational planning: -	
Schedule	4	Ass p mar	14	1	sc e	Assembly line management: -
Schedule	3	t p	7	0.75	sc p	Manufacturing planning and schedulin
Schedule	4	o p	7	1	sc p	Production scheduling: -
Scheduling	10	sce	283	0.14847		
Scheduling	15	sc p	74	0.85169		
Scheduling	3	sc e	24	0.78091	Assembly plant management: -	
Scheduling	2	sc e	57	0.2192	Decision support system: -	
Scheduling	4	scp	16	0.25	Tactical planning: -	
Scheduling	6	scp	8	0.75	Operational planning: -	
Scheduling	3	Ass p mar	14	1	sc e	Assembly line management: -
Scheduling	3	t p	7	0.75	sc p	Manufacturing planning and schedulin
Scheduling	6	o p	7	1	sc p	Production scheduling: -
Scheduling system	3	sce	283	1		
Scheduling system	2	sc e	24	0.66	Assembly plant management: -	
Scheduling system	2	Ass p mar	14	1	sc e	Assembly line management: -
Ship	39	sce	283	0.67126		
Ship	5	sc p	74	0.32912		
Ship	2	sc e	14	0.1357	Inventory management: -	
Ship	5	sc e	24	0.1979	Assembly plant management: -	
Ship	5	sc e	46	0.10325	E-commerce: -	
Ship	4	sc e	23	0.1652	Logistic management: -	
Ship	7	sc e	57	0.11666	Decision support system: -	
Ship	5	sc e	46	0.10325	Information system: -	
Ship	3	sc e	16	0.17811	Manufacturing control facility: -	
Ship	5	Ass p mar	14	1	sc e	Assembly line management: -
Ship	2	E com	8	0.4	sc e	Network based commerce: -
Ship	2	log man	4	0.71429	sc e	Logistic control: -
Ship	3	log man	15	0.28571	sc e	Logistic operation management: -
Ship	2	inf sys	12	0.4	sc e	Asset tracking system: -
Ship	2	man con f	9	0.40001	sc e	Manufacturing control station: -
Ship	3	man con f	9	0.60001	sc e	Manufacturing monitoring: -
Shipment	13	sce	283	1		
Shipment	2	sc e	14	0.36136	Inventory management: -	
Shipment	2	sc e	46	0.10998	E-commerce: -	
Shipment	3	sc e	23	0.32994	Logistic management: -	

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Shipment	2	sc e	57	0.08876	Decision support system: -	
Shipment	2	sc e	46	0.10998	Information system: -	
Shipment	2	log man	4	0.78947	sc e	Logistic control: -
Shipment	2	log man	15	0.21053	sc e	Logistic operation management: -
Simulation	10	sce	283	0.56719		
Simulation	2	sc p	74	0.43382		
Simulation	3	sc e	24	0.78091	Assembly plant management: -	
Simulation	2	sc e	57	0.2192	Decision support system: -	
Simulation	3	Ass p mai	14	1	sc e	Assembly line management: -
Supplier	30	sce	283	0.49513		
Supplier	8	sc p	74	0.50494		
Supplier	2	sc e	14	0.19587	Inventory management: -	
Supplier	3	sc e	24	0.17139	Assembly plant management: -	
Supplier	5	sc e	46	0.14904	E-commerce: -	
Supplier	4	sc e	23	0.23846	Logistic management: -	
Supplier	4	sc e	57	0.09622	Decision support system: -	
Supplier	5	sc e	46	0.14904	Information system: -	
Supplier	3	scp	16	0.375	Tactical planning: -	
Supplier	3	Ass p mai	14	1	sc e	Assembly line management: -
Supplier	2	E com	3	0.4	sc e	E-commerce system: -
Supplier	3	log man	4	0.84908	sc e	Logistic control: -
Supplier	2	log man	15	0.15095	sc e	Logistic operation management: -
Supplier	2	t p	7	0.66	sc p	Manufacturing planning and schedulin
Supply chain	36	sce	283	0.43971		
Supply chain	12	sc p	74	0.56053		
Supply chain	2	sc e	14	0.09791	Inventory management: -	
Supply chain	2	sc e	24	0.05711	Assembly plant management: -	
Supply chain	4	sc e	46	0.0596	E-commerce: -	
Supply chain	3	sc e	23	0.0894	Logistic management: -	
Supply chain	9	sc e	57	0.10822	Decision support system: -	
Supply chain	5	sc e	46	0.0745	Information system: -	
Supply chain	3	sc e	4	0.51402	Miscellaneous: -	
Supply chain	5	scp	20	0.41667	Strategic planning	
Supply chain	2	Ass p mai	14	1	sc e	Assembly line management: -
Supply chain	3	E com	8	0.75	sc e	Network based commerce: -
Supply chain	2	log man	15	0.666	sc e	Logistic operation management: -
Supply chain	2	inf sys	12	0.4	sc e	Asset tracking system: -
Supply chain	2	mis	3	0.6666	sc e	Supply chain financial model: -
Supply chain	5	s p	17	1	sc p	Enterprise and site planning: -
Supplying	8	sce	283	1		
Supplying	3	sc e	24	0.78125	Assembly plant management: -	
Supplying	2	sc e	57	0.2193	Decision support system: -	
Supplying	3	Ass p mai	14	1	sc e	Assembly line management: -
Time period	18	sce	283	0.48516		
Time period	5	sc p	74	0.51539		
Time period	2	sc e	24	0.16949	Assembly plant management: -	
Time period	3	sc e	23	0.26529	Logistic management: -	
Time period	5	sc e	57	0.17841	Decision support system: -	
Time period	3	sc e	46	0.13265	Information system: -	
Time period	2	sc e	16	0.25424	Manufacturing control facility: -	
Time period	2	log man	15	0.6666	sc e	Logistic operation management: -
Time period	2	inf sys	12	0.6666	sc e	Asset tracking system: -
Time period	2	man con t	9	1	sc e	Manufacturing monitoring: -
Tracking system	4	sce	283	1		

KEYWORDS USED	No. of document(Having keywords)	Subclass	Total no. of documents	Weight	Subclass	Subclass
Tracking system	2	sc e	57	0.44665	Decision support system: -	
Tracking system	2	sc e	46	0.55345	Information system: -	
Tracking system	2	inf sys	12	1	sc e	Asset tracking system: -
Transportation	7	sce	283	0.37937		
Transportation	3	sc p	74	0.62179		
Vehicle	21	sce	283	1		
Vehicle	6	sc e	12	0.59894	Transportation management: -	
Vehicle	5	sc e	23	0.26041	Logistic management: -	
Vehicle	3	sc e	57	0.06305	Decision support system: -	
Vehicle	3	sc e	46	0.07812	Information system: -	
Vehicle	6	Tr Man	12	1	sc e	Fleet management: -
Vehicle	3	log man	15	0.6	sc e	Logistic operation management: -
Vehicle	2	inf sys	12	0.666	sc e	Asset tracking system: -
Warehouse	13	sce	283	0.63013		
Warehouse	2	sc p	74	0.37074		
Warehouse	3	sc e	24	0.38985	Assembly plant management: -	
Warehouse	3	sc e	46	0.2034	E-commerce: -	
Warehouse	3	sc e	23	0.4068	Logistic management: -	
Warehouse	3	Ass p mar	14	1	sc e	Assembly line management: -
Web browser	5	sce	283	0.02464		
Web browser	4	sc p	74	0.07539		
Web browser	2	sc e	46	0.4	E-commerce: -	
Web server	5	sce	283	0.30357		
Web server	3	sc p	74	0.69657		
Web server	3	sc e	46	0.6	E-commerce: -	
WOM	3	sc p	74	1		
WOM	2	scp	8	0.84371	Operational planning: -	
WOM	2	o p	7	0.15636	sc p	Production scheduling: -
World Wide Web	4	sce	283	0.34382		
World Wide Web	2	sc p	74	0.65743		
World Wide Web	2	sc e	46	0.5	E-commerce: -	

ANNEXURE F

Assignee Name		
Assignee and Subclass	**Total No.**	**Weight**
International Business Machines Corporation (Armonk, NY)	24	
sc e(18)		0.439620129
sc p(6)		0.560416651
ass plant man		0.049455984
dss 6		0.124941434
e com 6		0.154818733
inf sys 3		0.077409367
mis 2		0.59347181
op plan 2		0.526315789
st plan 2		0.210526316
tat plan 2		0.263157895
i2 Technologies US, Inc. (Dallas, TX)	10	
sc e(3)		0.100863052
sc p(7)		0.900043716
dss 2		0.666666667
st p(6)		0.705882353
tac p		0.294117647
Accenture LLP (Palo Alto, CA)	6	
sce(6)		1
e-c(6)		1
i2 Technologies, Inc. (Irving, TX)	8	
sc e 2		0.080308384
sc p(6)		0.921375921
ass p man		0.515039143
dss		0.216858587
e com		0.268716075
st p 4		0.615384615
tac p		0.384615385
CIENA Corporation (Linthicum, MD)	3	
sc e 3		1
mf c fs 3		1
Infineon Technologies AG (Munich, DE)	2	
sc e 2		1
ass p man 2		1
The Chase Manhattan Bank (New York, NY)	2	
sc e 2		1
e com		0.080218193
mis		0.922509225
Koninklijke Philips Electronics N.V. (Eindhoven, NL)	2	
sc e 2		1
e com		0.5
inf sys		0.5

Assignee and Subclass	Total No.	Weight
Clear With Computers, Inc. (Mankato, MN)	2	
sc e(2)		1
dss(1)		0.446635938
inf sys(1)		0.553440184
Ford Motor Company (Dearborn, MI)	2	
sc e(2)		1
inf sy		0.342888493
mf c fac		0.657202944
Rock-Tenn Company (Norcross, GA)	2	
sc e 2		1
ass p man 2		1
Kabushiki Kaisha Toshiba (Kawasaki, JP)	2	
sc e 2		1
ass pl man		0.703703704
dss		0.296296296
International Business Machines Corp. (Armonk, NY)	2	
sc e 2		1
dss 2		1
Hitachi, Ltd. (Tokyo, JP)	5	
sc e 5		1
ass pl man 1		0.542857143
dss 2		1

ANNEXURE G

AUTHOR'S NAME

Name	freq	subclass	Name	freq	subclass
Abrahamsson Steffen	2	sc exe	Li Shuchen	2	sc exe
Adams Brian C	3	sc exe	Lin Tao	4	sc exe
Alibrahim Hussam	2	sc exe	Lin Tiaohua	2	sc p
Altman Arthur H.	3	sc p	Lu David Jun	2	sc exe
Armentrout Olin	2	sc exe	Madam Vijay Kumar	2	sc exe
Bakkalbasi Omer	4	sc exe	Marshall James	2	sc exe
Bakkalbasi Omer	2	sc p	Matsubayashi Michinori	2	sc exe
Bargh Adrian Neil	3	sc exe	Matsui Toshinari	2	sc exe
Baseman Robert	2	sc exe	Mayer John E.	4	sc exe
Bastian, II William A.	2	sc exe	Mayer John E.	8	sc p
Bellini Joseph M.	2	sc p	Mikurak Michael G.	4	sc exe
Bhaskaran Kumar	2	sc exe	Miller Jeffrey	2	sc exe
Bibbee Jeffrey N.	2	sc exe	Milne Robert J.	4	sc exe
Bodin William Kress	2	sc exe	Miyasaka Kazumi	2	sc exe
Bourne Robert D.	3	sc exe	Momyer Douglas A.	2	sc exe
Bowman-Amuah Michel K	2	sc exe	Moore Herbert J.	2	sc exe
Brandt Gary	2	sc exe	Morenz Robert G.	2	sc exe
Braun Heinrich	2	sc p	Morita Toru	3	sc exe
Brown Tim	2	sc p	Morrison Matthew J.	2	sc exe
Burchett Christopher D.	5	sc p	Natarajan Bharath	3	sc p
Burnard Mike Robert	2	sc exe	Nayak Nitin	2	sc exe
Burney Jessica	4	sc exe	Newberry Rande W.	2	sc p
Callen Kevin	2	sc exe	Nickey Carolyn M.	2	sc exe
Caswell Robert L.	2	sc exe	Notani Ranjit N.	6	sc exe
Catan Carolyn Ramsey	7	sc exe	Notani Ranjit N.	23	sc p
Chan Lap Mui Ann	4	sc exe	Okayama Nobuya	2	sc p
Chen Lawton	2	sc exe	Okuyama Katsuo	2	sc exe
Cherneff Jonathan M.	2	sc p	Olden Eric M.	2	sc exe
Chin Goodwin R.	2	sc exe	O'Leary Denis	4	sc exe
Chisolm David A.	2	sc exe	Orzell Robert A.	4	sc exe
Chisolm David A.	2	sc p	Owen Stephen	3	sc exe
Connors Daniel P.	2	sc exe	Pape William R.	2	sc exe
Crawford, Jr. James M.	2	sc p	Parasnis Abhay V.	2	sc exe
Csipkes Andrei	6	sc exe	Parasnis Abhay V.	12	sc p
Cudahy Gregory C.	2	sc exe	Pati Mahesh C.	2	sc exe
Curkendall Leland D.	2	sc exe	Pearson Douglas R.	2	sc p
Cybulski Eric R.	2	sc exe	Perkowski Thomas J.	6	sc exe
D'Agostino Vincent	4	sc exe	Peterson Larry C.	2	sc exe
D'Amelio Vince	4	sc exe	Poole Elizabeth Jodi	2	sc exe

Name	freq	subclass	Name	freq	subclass
Dangat Geetaram S.	2	sc exe	Prabhakaran Sanjiv	2	sc exe
Debetaz Weylin J.	3	sc exe	Price Eric	2	sc exe
Dehn Francis D.	2	sc exe	Proudfoot Andrew H.	3	sc exe
DeMuro Richard Thomas	2	sc exe	Radican Joseph E.	3	sc exe
Desiraju Ramakrishna	4	sc exe	Ramaswamy Sanjay Elat	2	sc exe
Desiraju Ramakrishna	2	sc p	Ransford Mike J.	4	sc exe
Dickson David P	3	sc exe	Reid Robert L.	2	sc exe
Dietrich, Jr. Walter C.	2	sc exe	Riehl Juergen	2	sc exe
Dolan Andrew J.	2	sc exe	Ross G. Terry	2	sc exe
Dragon Paul	2	sc p	Routhier Edmond E.	2	sc exe
Dulaney Earl F.	2	sc exe	Sagar Ajit	2	sc exe
Ehrenleitner Franz	2	sc exe	Sagar Ajit	2	sc p
Elger Jurgen	2	sc exe	Saito Hiroyuki	2	sc exe
Engstrom Harold H.	6	sc exe	Sasaki Katsunao	2	sc exe
Estrada Julio	9	sc exe	Sasano Toshio	2	sc exe
Estrada Miguel	9	sc exe	Schwarten Dave A.	4	sc exe
Ettl Markus	4	sc exe	Shah Bhaven S.	2	sc exe
Evetts Gregory A.	2	sc exe	Shah Bhaven S.	2	sc p
Evetts Gregory A.	2	sc p	Sharp Shawn T.	2	sc exe
Federgruen Awi	4	sc exe	Shear Victor H.	2	sc exe
Fox Frederic D.	2	sc p	Sheehan, Jr. Richard L.	2	sc exe
Francis Robert C.	6	sc exe	Shkedy Gary	2	sc exe
Fu Bor-Ruey	2	sc p	Sitarski Edward	2	sc exe
Gigliotti Samuel Scott	2	sc exe	Sladek Marjorie	2	sc exe
Ginter Karl L.	2	sc exe	Sleep Nicholas J.	3	sc exe
Gokhale Anand R.	2	sc exe	Smith Michael	2	sc exe
Goss Lois	2	sc exe	Spahn Francis J.	2	sc exe
Grettve Per	2	sc exe	Srivastava Ashok N.	2	sc p
Gross Wilfried	2	sc exe	Sudou Kouji	2	sc exe
Hartley-Urquhart William I	2	sc exe	Summers Gary J.	4	sc exe
Haverstock Paul	9	sc exe	Swan Richard J.	4	sc exe
Hegde Sanjay R.	2	sc exe	Tang Jung-Mu	2	sc exe
Hennig Carole	2	sc exe	Taylor John Timothy	2	sc exe
Hilerio Israel	2	sc exe	Terabayashi Eiichi	2	sc exe
Hilerio Israel	4	sc p	Terashima Hiroyoshi	2	sc exe
Hodges Jan N.	2	sc exe	Thomas Dennis R.	2	sc exe
Hogerton Peter B.	2	sc exe	Thrift John R.	2	sc exe
Horst Robert L.	2	sc exe	Tomforde Johann	2	sc exe
Howie George R.	3	sc p	Tong Sai-Kit K.	2	sc exe
Huang Ying	4	sc exe	Transportation planning:	o p	sc p
Igawa Kumiko	2	sc p	Tyberghein Mike	4	sc exe

Name	freq	subclass	Name	freq	subclass
Ishiwata Masao	2	sc exe	Uchibori Hidetoshi	2	sc exe
Johnson James M.	2	sc exe	Underwood Roy Aaron	4	sc exe
Johnson Jerome D.	3	sc exe	Van der Veen Wouter	4	sc exe
Ka	46	sc exe	Van Wie David M.	2	sc exe
Ka	10	sc p	Venkatasubramanyan Na	2	sc p
Kazemi Niakam	2	sc exe	Vogler Hartmut K.	4	sc exe
Kennedy Brian M.	9	sc p	Vrieling James	4	sc exe
Kil David	2	sc exe	Waller Matthew A.	2	sc exe
Kinross Robert P.	2	sc exe	Weinand Hans-Joachim	2	sc exe
Kirkegaard Jon R.	3	sc p	Weinstein Syd	2	sc p
Klink Allan	2	sc exe	Weisser, Jr. Paul T.	3	sc p
Koike Hiroshi	2	sc p	Whipple Mark B.	12	sc p
Krasinski Ray	2	sc p	White Jason S.	6	sc exe
Kroening James L.	2	sc exe	Wilson James R.	3	sc exe
Kubo Shigeru	2	sc exe	Wong Charles	2	sc exe
Kumar Krishna	2	sc p	Yablonski Mark S.	3	sc exe
Kunchithapatham Arun	2	sc p	Yamamoto Tsukasa	3	sc exe
Kwiatkowski Steven E.	2	sc exe	Yao David Da-Wei	2	sc exe
Landvater Darryl V.	2	sc exe	Yen Chih-Kuan	2	sc exe
Lawrence James	3	sc exe	Yoshida Eichi	3	sc exe
Leung Ying Tat	2	sc exe	Zimmerman Thomas Gu	2	sc exe

ANNEXURE H

I-Class Weight

I-Class	Subclass	Subclass	Subclass	Weight
g06f 007/00	sc e	Inventory management: -		1
g06f 015/24 g08b 005/22	sc e	Inventory management: -		1
a61b 005/00	dss	sc e	Management training system: -	1
a61b 005/00 g06f 019/00	sc e	Decision support system: -		0.5
a61b 005/00 g06f 019/00	inf sys	sc e	Supply chain network informa	0.5
a61n 001/00	mis	sc e	Supply chain financial model:	1
a61n 005/04	sc e	Decision support system: -		1
a61n 005/04	inf sys	sc e	Supply chain network informa	1
a63f 009/24	inf sys	sce	Freight distribution system: -	1
b07c 005/00	man con fac	sc e	Manufacturing control station:	1
b23b 013/04 b23b 003/36 b2	sc e	Decision support system: -		0.44664
b23b 013/04 b23b 003/36 b2	sc e	Information system: -		0.55344
b23p 021/00	Ass p man	sc e	Assembly line management: -	1
b32b 031/00 b65c 011/04	Ass p man	sc e	Assembly system management	1
b60l 001/00	Ass p man	sc e	Assembly integration: -	1
b60p 003/42 b60p 003/08	Tr Man	sc e	Fleet management: -	1
b60p 003/42 b60p 003/08	inf sys	sce	Freight distribution system: -	1
b60p 007/08	Ass p man	sc e	Assembly integration: -	1
b60t 007/16 g06f 017/00	log man	sc e	Logistic operation managemen	1
b62d 065/00	man con fac	sc e	Manufacturing control station:	1
b63b 035/30	Tr Man	sc e	Fleet management: -	1
b63b 067/60	Tr Man	sc e	Fleet management: -	1
b65b 051/30 b65b 009/06 b6	Ass p man	sc e	Assembly line management: -	1
b65g 001/00	Ass p man	sc e	Assembly line management: -	1
b65g 021/22	Tr Man	sc e	Fleet management: -	1
b65g 029/00	Tr Man	sc e	Fleet management: -	1
c07h 021/04	Tr Man	sc e	Fleet management: -	1
f01k 013/02	Ass p man	sc e	Assembly line management: -	1
f16g 013/00	dss	sc e	Manufacturing logistic decisio	1
f16g 013/16	E com	sc e	Network based commerce: -	1
g01n 037/00 g06f 019/00	sce	quality control		0.5
g01n 037/00 g06f 019/00	Tr Man	sc e	Fleet management: -	0.5
g01r 023/02 g01r 013/14	sc e	Decision support system: -		0.5
g01r 023/02 g01r 013/14	inf sys	sc e	Inventory information system:	0.5
g01r 031/02	Ass p man	sc e	Assembly system management	1
g01s 003/02 g01s 013/08 g08	log man	sc e	Logistic operation managemen	0.66674
g01s 003/02 g01s 013/08 g08	inf sys	sc e	Asset tracking system: -	0.33337
g01s 003/80	sc e	Decision support system: -		0.12099
g01s 003/80	log man	sc e	Logistic operation managemen	0.29985
g01s 003/80	inf sys	sc e	Asset tracking system: -	0.14993
g01v 003/08	man con fac	sc e	Manufacturing monitoring: -	0.43103
g05b 017/00	dss	sc e	Management training system: -	1
g05b 017/00 g06f 017/60	dss	sc e	Management training system: -	1
g05d 001/00 g01c 021/00 g0	log man	sc e	Logistic control: -	1
g06f 003/00	t p	sc p	Supply chain planning: -	1
g06f 003/14 g06f 019/00	man con fac	sc e	Manufacturing control station:	1
g06f 007/00	Ass p man	sc e	Assembly system management	0.1028
g06f 007/00	Ass p man	sc e	Assembly line management: -	0.61683
g06f 007/00	log man	sc e	Logistic control: -	0.10727
g06f 007/00	dss	sc e	Manufacturing logistic decisio	0.08657
g06f 007/00	dss	sc e	Management training system: -	0.08657
g06f 007/00 g06g 001/14	sc e	Decision support system: -		0.16788
g06f 007/00 g06g 001/14	sc e	Information system: -		0.41606
g06f 007/00 g06g 001/14	sc e	Information system: -		0.41606
g06f 009/00	t p	sc p	Manufacturing planning and s	1
g06f 009/445	E com	sc e	Network based commerce: -	1

ANNEXURE I

U-class	Subclass	Subclass	Subclass	Weight
235/375 235/462.01 235/462.25	sc e	Information system: -		1
235/375 235/462.01 235/487	sc e	E-commerce: -		0.500901623
235/375 235/462.01 235/487	sc e	Information system: -		0.500901623
235/380 235/375 235/379 902/26	E com	sc e	Electronic fund transfer: -	1
235/383 235/385 235/375 705/18 705/22	sc e	Logistic management: -		0.318288879
235/383 235/385 235/375 705/18 705/22	inv man	sc e	Inventory control: -	0.522903158
235/383 235/385 235/375 705/18 705/22	E com	sc e	Online shopping: -	0.159144439
235/384 235/492	Tr Man	sc e	Fleet management: -	1
235/385	sc e	Logistic management: -		0.178189594
235/385	sc e	Decision support system: -		0.143802128
235/385	sc e	Decision support system: -		0.143802128
235/385	sc e	Information system: -		0.178189594
235/385	sc e	Information system: -		0.178189594
235/385	log man	sc e	Logistic operation management: -	0.178189594
235/385 235/383 235/384	sc e	Decision support system: -		0.212138569
235/385 235/383 235/384	sc e	Information system: -		0.262867357
235/385 235/383 235/384	log man	sc e	Logistic operation management: -	0.525734714
235/385 340/10.34	sc e	Inventory management: -		1
235/462.01 235/380 235/382	sc e	E-commerce: -		0.500095018
235/462.01 235/380 235/382	sc e	Information system: -		0.500095018
235/472.02 235/375 235/462.45	sc e	Information system: -		1
235/486 235/492	sc e	Logistic management: -		0.525734714
235/486 235/492	sc e	Decision support system: -		0.212138569
235/486 235/492	sc e	Information system: -		0.262867357
235/486 235/492	log man	sc e	Logistic operation management: -	1
235/91r 73/828 324/206	man con fac	sc e	Manufacturing monitoring: -	1
280/79.2 280/651 410/66	Ass p man	sc e	Assembly integration: -	1
29/714 29/783 29/786 29/793 198/346.2 198/465	Ass p man	sc e	Assembly line management: -	1
29/771 29/783 29/791 29/822 52/31 52/79.4 52/2	sc e	Assembly plant management: -		1
29/783 29/281.5 29/714 29/791 29/795 228/4.1 2	man con fac	sc e	Manufacturing control station: -	1
324/158.1 324/752 324/753	Ass p man	sc e	Assembly system management: -	1
324/76.39 324/76.24	sc e	Decision support system: -		1
340/5.92 340/5.9 340/825.52 705/28 705/29	sc e	Inventory management: -		1
340/572.1 340/5.92 340/10.1 340/505 700/215 7(	sc e	Logistic management: -		0.525734714
340/572.1 340/5.92 340/10.1 340/505 700/215 7(	sc e	Decision support system: -		0.212138569
340/572.1 340/5.92 340/10.1 340/505 700/215 7(	sc e	Information system: -		0.262867357
340/573.3 119/51.02	sc e	Logistic management: -		0.525734714
340/573.3 119/51.02	sc e	Decision support system: -		0.212138569
340/573.3 119/51.02	sc e	Information system: -		0.262867357
340/988 340/438 340/995.19	Tr Man	sc e	Fleet management: -	1
342/457 235/384 340/5.42 340/10.2 340/10.5 34(	inf sys	sce	Freight distribution system: -	1
342/458 342/47 340/511 340/572.4 340/686.6	sc e	Logistic management: -		0.525734714
342/458 342/47 340/511 340/572.4 340/686.6	sc e	Decision support system: -		0.212138569
342/458 342/47 340/511 340/572.4 340/686.6	sc e	Information system: -		0.262867357
342/458 342/47 340/511 340/572.4 340/686.6	log man	sc e	Logistic operation management: -	1
345/419 345/782 345/848 705/7 705/8 705/28 70	E com	sc e	E-commerce system: -	0.525734714
345/419 345/782 345/848 705/7 705/8 705/28 70	log man	sc e	Logistic control: -	0.212138569
345/419 345/782 345/848 705/7 705/8 705/28 70	dss	sc e	Management training system: -	0.262867357
345/440	sc e	Decision support system: -		1
345/705 345/965 345/970 348/125 382/141 382/1	man con fac	sc e	Manufacturing control station: -	1
345/733 703/21	Ass p man	sc e	Assembly line management: -	
345/733 703/21	E com	sc e	Network based commerce: -	1
345/733 703/21	s p	sc p	Enterprise and site planning: -	1
367/118 367/128	sc e	Decision support system: -		0.525734714
367/118 367/128	sc e	Information system: -		0.212138569
367/118 367/128	log man	sc e	Logistic operation management: -	0.262867357
370/254 370/385 370/386 370/400 379/221.05	s p	sc p	Enterprise and site planning: -	1
379/221.13 345/700 379/221.14	sc e	Decision support system: -		0.446635938
379/221.13 345/700 379/221.14	inf sys	sc e	Supply chain network information syste	0.553440184
379/265.02 379/266.08	E com	sc e	Electronic fund transfer: -	1
40/449 40/452 340/815.62	dss	sc e	Management training system: -	1
414/800 414/812	Tr Man	sc e	Fleet management: -	0.793650794
414/800 414/812	inf sys	sce	Freight distribution system: -	0.207039337
414/803 212/270 212/344 414/140.3	Tr Man	sc e	Fleet management: -	1
463/42	inf sys	sce	Freight distribution system: -	1
53/550 53/201 53/374.4 156/582 156/583.1	Ass p man	sc e	Assembly line management: -	1
536/23.53 435/69.6 435/320.1 435/328	Tr Man	sc e	Fleet management: -	1
59/78.1 59/900 248/49	E com	sc e	Network based commerce: -	1
60/660 60/652 700/291	Ass p man	sc e	Assembly line management: -	1

ANNEXURE J

Attribute Keyword pair and Ratio 3 Calculation

KEYWORD PAIRS USED	No. of Document(Having Keyword)pairs	Subclass	Weight	Subclass	Subclass
bro,data	9	Ass p man	1	sc e	Assembly line management: -
bro,inventory	37	Ass p man	1	sc e	Assembly line management: -
bro,network	3	E com	1	sc e	Web commerce: -
bro,operation	103	Ass p man	1	sc e	Assembly line management: -
bro,schedule	83	Ass p man	1	sc e	Assembly line management: -
bro,warehouse	77	Ass p man	1	sc e	Assembly line management: -
computer implemented,data	45	log man	1	sc e	Logistic operation management: -
computer implemented,eas	28	s p	1	sc p	Enterprise and site planning: -
computer implemented,enterprise	11	s p	1	sc p	Enterprise and site planning: -
computer implemented,information	57	s p	1	sc p	Enterprise and site planning: -
computer implemented,mrp	90	t p	1	sc p	Manufacturing planning and scheduling: -
computer implemented,network	164	s p	1	sc p	Enterprise and site planning: -
computer implemented,node	93	s p	1	sc p	Enterprise and site planning: -
computer implemented,schedule	106	t p	1	sc p	Manufacturing planning and scheduling: -
computer implemented,supply chain	82	log man	1	sc e	Logistic operation management: -
computer implemented,time period	123	log man	1	sc e	Logistic operation management: -
consumer,container	146	Ass p man	1	sc e	Assembly line management: -
consumer,demand	19	E com	1	sc e	Electronic fund transfer: -
consumer,display	101	Ass p man	1	sc e	Assembly line management: -
consumer,eas	18	Ass p man	1	sc e	Assembly line management: -
consumer,inventory	31	Ass p man	1	sc e	Assembly line management: -
consumer,ipa	112	E com	1	sc e	Electronic fund transfer: -
consumer,network	50	E com	1	sc e	Electronic fund transfer: -
consumer,networks	50	E com	1	sc e	Electronic fund transfer: -
consumer,packaging	60	Ass p man	1	sc e	Assembly line management: -
consumer,performance	68	Ass p man	1	sc e	Assembly line management: -
consumer,purchase	97	E com	1	sc e	Electronic fund transfer: -
consumer,ship	123	Ass p man	1	sc e	Assembly line management: -
consumer,shipment	123	Ass p man	1	sc e	Assembly line management: -
consumer,supply chain	28	Ass p man	1	sc e	Assembly line management: -
container,customer	60	Ass p man	1	sc e	Assembly line management: -
container,data	45	Ass p man	1	sc e	Assembly line management: -
container,display	44	Ass p man	1	sc e	Assembly line management: -
container,eas	165	Ass p man	1	sc e	Assembly line management: -
container,information	70	Ass p man	1	sc e	Assembly line management: -
container,inventory	114	Ass p man	1	sc e	Assembly line management: -
container,location	4	Ass p man	1	sc e	Assembly line management: -
container,operation	117	Ass p man	1	sc e	Assembly line management: -
container,packaging	12	Ass p man	1	sc e	Assembly line management: -
container,performance	77	Ass p man	1	sc e	Assembly line management: -
container,ship	23	Ass p man	1	sc e	Assembly line management: -
container,shipment	23	Ass p man	1	sc e	Assembly line management: -
container,supply chain	117	Ass p man	1	sc e	Assembly line management: -
customer,data	8	inv man	0.113225	sc e	Inventory control: -
customer,data	14	Ass p man	0.434028	sc e	Assembly line management: -
customer,data	1	log man	0.452899	sc e	Logistic operation management: -
customer,display	28	Ass p man	1	sc e	Assembly line management: -
customer,eas	53	Ass p man	0.657203	sc e	Assembly line management: -
customer,eas	55	log man	0.342888	sc e	Logistic operation management: -
customer,forecast	70	t p	1	sc p	Available to promise: -
customer,information	10	Ass p man	0.793651	sc e	Assembly line management: -
customer,information	17	log man	0.207039	sc e	Logistic operation management: -
customer,inventory	40	Ass p man	1	sc e	Assembly line management: -
customer,location	8	Ass p man	1	sc e	Assembly line management: -
customer,operation	57	Ass p man	1	sc e	Assembly line management: -
customer,operation	57	Ass p man	1	sc e	Assembly line management: -
customer,packaging	47	Ass p man	1	sc e	Assembly line management: -

KEYWORD PAIRS USED	No. of Document(Having Keyword)pairs	Subclass	Weight	Subclass	Subclass
customer,performance	3	Ass p man	1	sc e	Assembly line management: -
customer,schedule	14	Ass p man	1	sc e	Assembly line management: -
customer,ship	50	Ass p man	1	sc e	Assembly line management: -
customer,shipment	50	Ass p man	1	sc e	Assembly line management: -
customer,supply chain	43	Ass p man	0.657203	sc e	Assembly line management: -
customer,supply chain	106	log man	0.342888	sc e	Logistic operation management: -
data,demand	42	dss		sc e	
data,demand	125	s p		sc p	Enterprise and site planning: -
data,display	28	Tr Man		sc e	Fleet management: -
data,display	42	dss	1	sc e	Management training system: -
data,display	14	man con fac	1	sc e	Manufacturing control station: -
data,eas	16	inv man	0.072325	sc e	Inventory control: -
data,eas	42	Ass p man	0.04219	sc e	Assembly line management: -
data,eas	39	E com	0.066036	sc e	Electronic fund transfer: -
data,eas	18	Tr Man	0.08438	sc e	Fleet management: -
data,eas	193	log man	0.220121	sc e	Logistic operation management: -
data,eas	54	dss	0.053292	sc e	Management training system: -
data,eas	2	inf sys	0.044024	sc e	Supply chain network information system: -
data,eas	60	man con fac	0.189854	sc e	Manufacturing control station: -
data,eas	38	s p	0.101256	sc p	Enterprise and site planning: -
data,eas	89	t p	0.126569	sc p	Manufacturing planning and scheduling: -
data,enterprise	11	s p	1	sc p	Enterprise and site planning: -
data,firewall	65	E com	1	sc e	Enterprise security: -
data,forecast	98	t p	1	sc p	Inventory planning: -
data,gui	42	Tr Man	1	sc e	Fleet management: -
data,information	24	Ass p man	0.052893	sc e	Assembly line management: -
data,information	116	E com	0.055193	sc e	Electronic fund transfer: -
data,information	15	Tr Man	0.211573	sc e	Fleet management: -
data,information	15	log man	0.165579	sc e	Logistic operation management: -
data,information	35	dss	0.011135	sc e	Management training system: -
data,information	80	inf sys	0.027596	sc e	Supply chain network information system: -
data,information	14	man con fac	0.15868	sc e	Manufacturing monitoring: -
data,information	16	mis	0.15868	sc e	Supply chain financial model: -
data,information	36	s p	0.15868	sc p	Enterprise and site planning: -
data,inventory	46	Ass p man	1	sc e	Assembly line management: -
data,ipa	6	E com	1	sc e	Electronic fund transfer: -
data,location	29	Ass p man	0.129965	sc e	Assembly line management: -
data,location	47	E com	0.203423	sc e	Electronic fund transfer: -
data,location	19	Tr Man	0.259929	sc e	Fleet management: -
data,location	43	log man	0.406846	sc e	Logistic operation management: -
data,network	20	inv man	0.165267	sc e	Inventory control: -
data,network	69	E com	0.553287	sc e	Web commerce: -
data,network	91	inf sys	0.050299	sc e	Supply chain network information system: -
data,network	64	s p	0.231374	sc p	Enterprise and site planning: -
data,node	30	inf sys	0.179662	sc e	Supply chain network information system: -
data,node	21	s p	0.826446	sc p	Enterprise and site planning: -
data,operation	71	Ass p man	0.253807	sc e	Assembly line management: -
data,operation	119	E com	0.088281	sc e	Electronic fund transfer: -
data,operation	58	dss	0.035622	sc e	Manufacturing logistic decision support: -
data,operation	39	man con fac	0.126904	sc e	Manufacturing control station: -
data,operation	3	mis	0.507614	sc e	Supply chain financial model: -
data,packaging	32	Ass p man	1	sc e	Assembly line management: -
data,performance	0	inv man	0.627117	sc e	Inventory control: -
data,performance	34	man con fac	0.365818	sc e	Manufacturing control station: -
data,planning engine	4	s p	1	sc p	Enterprise and site planning: -
data,rfid	3	log man	1	sc e	Logistic operation management: -
data,schedule	73	Ass p man	0.400256	sc e	Assembly line management: -
data,schedule	102	t p	0.600384	sc p	Manufacturing planning and scheduling: -
data,supplier	9	log man	1	sc e	Logistic control: -

KEYWORD PAIRS USED	No. of Document(Having Keyword)pairs	Subclass	Weight	Subclass	Subclass
data,supply chain	22	E com	0.065155	sc e	Network based commerce: -
data,supply chain	104	log man	0.195466	sc e	Logistic operation management: -
data,supply chain	24	inf sys	0.065155	sc e	Supply chain network information system: -
data,supply chain	70	mis	0.374644	sc e	Supply chain financial model: -
data,supply chain	18	s p	0.299715	sc p	Enterprise and site planning: -
data,time period	77	log man	1	sc e	Logistic operation management: -
data,tracking system	3	log man	1	sc e	Logistic operation management: -
data,transportation	25	Tr Man	1	sc e	Fleet management: -
data,vehicle	8	Tr Man	0.74206	sc e	Fleet management: -
data,vehicle	115	log man	0.258108	sc e	Logistic operation management: -
data,warehouse	67	Ass p man	1	sc e	Assembly line management: -
data,web browser	56	E com	1	sc e	Web commerce: -
demand,eas	38	inf sys	1	sc e	Inventory information system: -
demand,enterprise	140	s p	1	sc p	Enterprise and site planning: -
demand,forecast	4	t p	1	sc p	Inventory planning: -
demand,information	88	s p	1	sc p	Enterprise and site planning: -
demand,inventory	55	inf sys	1	sc e	Inventory information system: -
demand,ipa	131	E com	1	sc e	Electronic fund transfer: -
demand,network	30	E com	1	sc e	Electronic fund transfer: -
demand,networks	30	E com	1	sc e	Electronic fund transfer: -
demand,planning engine	130	s p	1	sc p	Enterprise and site planning: -
demand,purchase	116	E com	1	sc e	Electronic fund transfer: -
demand,supply chain	144	s p	1	sc p	Enterprise and site planning: -
display,eas	120	Ass p man	0.186846	sc e	Assembly line management: -
display,eas	9	E com	0.097485	sc e	Online shopping: -
display,eas	30	dss	0.157344	sc e	Management training system: -
display,eas	56	man con fac	0.560538	sc e	Manufacturing control station: -
display,information	15	E com	0.115634	sc e	Online shopping: -
display,information	44	Tr Man	0.886525	sc e	Fleet management: -
display,inventory	69	Ass p man	0.657203	sc e	Assembly line management: -
display,inventory	43	E com	0.342888	sc e	Online shopping: -
display,network	6	E com	1	sc e	Online shopping: -
display,operation	25	man con fac	1	sc e	Manufacturing control station: -
display,packaging	40	Ass p man	1	sc e	Assembly line management: -
display,performance	32	Ass p man	0.400256	sc e	Assembly line management: -
display,performance	20	man con fac	0.600384	sc e	Manufacturing control station: -
display,purchase	5	E com	1	sc e	Online shopping: -
display,ship	21	Ass p man	1	sc e	Assembly line management: -
display,shipment	21	Ass p man	1	sc e	Assembly line management: -
display,supply chain	72	Ass p man	1	sc e	Assembly line management: -
display,vehicle	37	Tr Man		sc e	Fleet management: -
eas,enterprise	45	s p	1	sc p	Enterprise and site planning: -
eas,gui	13	Tr Man	1	sc e	Fleet management: -
eas,information	143	E com	0.180408	sc e	Electronic fund transfer: -
eas,information	13	log man	0.360815	sc e	Logistic operation management: -
eas,information	56	dss	0.072796	sc e	Management training system: -
eas,information	47	inf sys	0.180408	sc e	Supply chain network information system: -
eas,information	5	s p	0.207469	sc p	Enterprise and site planning: -
eas,inventory	52	inv man	0.573723	sc e	Inventory control: -
eas,inventory	50	Ass p man	0.167336	sc e	Assembly line management: -
eas,inventory	87	E com	0.174611	sc e	Online shopping: -
eas,inventory	7	inf sys	0.087306	sc e	Inventory information system: -
eas,ipa	3	E com	0.55344	sc e	Electronic fund transfer: -
eas,ipa	92	dss	0.446636	sc e	Management training system: -
eas,location	62	Ass p man	0.389955	sc e	Assembly line management: -
eas,location	79	E com	0.203455	sc e	Electronic fund transfer: -
eas,location	147	log man	0.406909	sc e	Logistic operation management: -
eas,mrp	62	t p	1	sc p	Manufacturing planning and scheduling: -
eas,network	2	inv man	0.4111	sc e	Inventory control: -

KEYWORD PAIRS USED	No. of Document(Having Keyword)pairs	Subclass	Weight	Subclass	Subclass
eas,network	17	E com	0.187676	sc e	Electronic fund transfer: -
eas,network	86	dss	0.050486	sc e	Management training system: -
eas,network	90	inf sys	0.062559	sc e	Supply chain network information system: -
eas,network	9	s p	0.28777	sc p	Enterprise and site planning: -
eas,node	20	inf sys	0.126604	sc e	Supply chain network information system: -
eas,node	19	s p	0.873566	sc p	Enterprise and site planning: -
eas,operation	123	E com	0.207039	sc e	Electronic fund transfer: -
eas,operation	30	Tr Man	0.793651	sc e	Fleet management: -
eas,operation	7	man con fac	1	sc e	Manufacturing control station: -
eas,packaging	79	Ass p man	1	sc e	Assembly line management: -
eas,performance	17	Inv man	0.578369	sc e	Inventory control: -
eas,performance	87	Ass p man	0.168691	sc e	Assembly line management: -
eas,performance	2	man con fac	0.253036	sc e	Manufacturing control station: -
eas,purchase	19	E com	1	sc e	Online shopping: -
eas,schedule	38	Ass p man	1	sc e	Assembly line management: -
eas,ship	142	Ass p man	1	sc e	Assembly line management: -
eas,shipment	142	Ass p man	1	sc e	Assembly line management: -
eas,simulation	99	dss	1	sc e	Management training system: -
eas,supply chain	47	Ass p man	0.657203	sc e	Assembly line management: -
eas,supply chain	144	inf sys	0.342888	sc e	Supply chain network information system: -
eas,tracking system	38	log man	1	sc e	Logistic operation management: -
eas,transportation	150	Tr Man	1	sc e	Fleet management: -
eas,vehicle	18	Tr Man	1	sc e	Fleet management: -
eas,vehicle	135	log man	1	sc e	Logistic operation management: -
eas,warehouse	18	Ass p man	1	sc e	Assembly line management: -
electronic commerce,information	38	E com	1	sc e	Electronic fund transfer: -
electronic commerce,ipa	2	E com	1	sc e	Electronic fund transfer: -
electronic commerce,node	28	E com	1	sc e	Electronic fund transfer: -
enterprise,information	51	s p	11	sc p	Enterprise and site planning: -
enterprise,network	34	s p	1	sc p	Enterprise and site planning: -
enterprise,node	33	s p	1	sc p	Enterprise and site planning: -
enterprise,planning engine	8	s p	1	sc p	Enterprise and site planning: -
enterprise,supply chain	3	s p	1	sc p	Enterprise and site planning: -
firewall,network	1	E com	1	sc e	Enterprise security: -
forecast,forecasting	0	t p	1	sc p	Inventory planning: -
gui,information	5	Tr Man	1	sc e	Fleet management: -
gui,vehicle	31	Tr Man	1	sc e	Fleet management: -
information,inventory	12	E com	1	sc e	Online shopping: -
information,ipa	122	E com	0.650223	sc e	Electronic fund transfer: -
information,ipa	42	dss	0.349828	sc e	Management training system: -
information,location	38	E com	0.077946	sc e	Electronic fund transfer: -
information,location	17	Tr Man	0.298793	sc e	Fleet management: -
information,location	26	log man	0.623568	sc e	Logistic operation management: -
information,network	0	E com	0.525894	sc e	Online shopping: -
information,network	29	dss	0.106101	sc e	Management training system: -
information,network	136	inf sys	0.065737	sc e	Supply chain network information system: -
information,network	106	s p	0.302389	sc p	Enterprise and site planning: -
information,node	10	E com	0.666742	sc e	Electronic fund transfer: -
information,node	50	inf sys	0.333371	sc e	Supply chain network information system: -
information,operation	60	Ass p man	0.193289	sc e	Assembly line management: -
information,operation	2	E com	0.033615	sc e	Electronic fund transfer: -
information,operation	71	mis	0.773156	sc e	Supply chain financial model: -
information,packaging	57	Ass p man	1	sc e	Assembly line management: -
information,planning engine	41	s p	1	sc p	Enterprise and site planning: -
information,purchase	9	E com	1	sc e	Online shopping: -
information,rfid	4	log man	1	sc e	Logistic operation management: -
information,schedule	25	Ass p man	1	sc e	Assembly line management: -
information,simulation	42	dss	1	sc e	Management training system: -
information,supply chain	81	E com	0.045252	sc e	Network based commerce: -

KEYWORD PAIRS USED	No. of Document(Having Keyword)pairs	Subclass	Weight	Subclass	Subclass
information,supply chain	9	log man	0.181009	sc e	Logistic operation management: -
information,supply chain	73	inf sys	0.045252	sc e	Supply chain network information system: -
information,supply chain	45	mis	0.5204	sc e	Supply chain financial model: -
information,supply chain	55	s p	0.20816	sc p	Enterprise and site planning: -
information,time period	67	log man	1	sc e	Logistic operation management: -
information,transportation	28	Tr Man	1	sc e	Fleet management: -
information,vehicle	6	Tr Man	0.657203	sc e	Fleet management: -
information,vehicle	98	log man	0.342888	sc e	Logistic operation management: -
inventory,network	13	inv man	0.765456	sc e	Inventory control: -
inventory,network	13	E com	0.232965	sc e	Online shopping: -
inventory,operation	140	Ass p man	1	sc e	Assembly line management: -
inventory,packaging	28	Ass p man	1	sc e	Assembly line management: -
inventory,performance	50	inv man	0.631608	sc e	Inventory control: -
inventory,performance	36	Ass p man	0.368438	sc e	Assembly line management: -
inventory,purchase	107	E com	1	sc e	Online shopping: -
inventory,schedule	120	Ass p man	1	sc e	Assembly line management: -
inventory,ship	91	Ass p man	1	sc e	Assembly line management: -
inventory,shipment	91	Ass p man	1	sc e	Assembly line management: -
inventory,supply chain	2	Ass p man	1	sc e	Assembly line management: -
inventory,warehouse	114	Ass p man	1	sc e	Assembly line management: -
ipa,network	162	E com	0.55344	sc e	Electronic fund transfer: -
ipa,network	5	dss	0.446636	sc e	Management training system: -
ipa,networks	162	E com	1	sc e	Electronic fund transfer: -
ipa,node	32	E com	1	sc e	Electronic fund transfer: -
ipa,operation	125	E com	1	sc e	Electronic fund transfer: -
ipa,purchase	15	E com	1	sc e	Electronic fund transfer: -
ipa,simulation	8	dss	1	sc e	Management training system: -
location,network	95	E com	1	sc e	Electronic fund transfer: -
location,operation	6	E com	1	sc e	Electronic fund transfer: -
location,rfid	20	log man	1	sc e	Logistic operation management: -
location,schedule	23	Ass p man	1	sc e	Assembly line management: -
location,supply chain	27	Ass p man	0.489367	sc e	Assembly line management: -
location,supply chain	13	log man	0.510644	sc e	Logistic operation management: -
location,tracking system	107	log man	1	sc e	Logistic operation management: -
location,transportation	45	Tr Man	1	sc e	Fleet management: -
location,vehicle	11	Tr Man	0.389955	sc e	Fleet management: -
location,vehicle	2	log man	0.610364	sc e	Logistic operation management: -
mrp,schedule	15	t p	1	sc p	Manufacturing planning and scheduling: -
network,networks	0	E com	1	sc e	Electronic fund transfer: -
network,networks	0	E com	1	sc e	Electronic fund transfer: -
network,node	59	inf sys	0.303196	sc e	Supply chain network information system: -
network,node	10	s p	0.69735	sc p	Enterprise and site planning: -
network,operation	31	E com	1	sc e	Electronic fund transfer: -
network,performance	0	inv man	1	sc e	Inventory control: -
network,purchase	56	E com	1	sc e	Electronic fund transfer: -
network,simulation	12	dss	1	sc e	Management training system: -
network,supply chain	100	E com	1	sc e	Network based commerce: -
network,web browser	2	E com	1	sc e	Web commerce: -
networks,purchase	147	E com	1	sc e	Electronic fund transfer: -
node,supply chain	124	inf sys	1	sc e	Supply chain network information system: -
operation,packaging	104	Ass p man	1	sc e	Assembly line management: -
operation,performance	4	man con fac	1	sc e	Manufacturing control station: -
operation,schedule	19	Ass p man	1	sc e	Assembly line management: -
operation,supply chain	117	mis	1	sc e	Supply chain financial model: -
operation,transportation	81	Tr Man	1	sc e	Fleet management: -
operation,vehicle	82	Tr Man	1	sc e	Fleet management: -
operation,warehouse	25	Ass p man	1	sc e	Assembly line management: -
packaging,performance	7	Ass p man	1	sc e	Assembly line management: -
packaging,ship	62	Ass p man	1	sc e	Assembly line management: -

KEYWORD PAIRS USED	No. of Document(Having Keyword)pairs	Subclass	Weight	Subclass	Subclass
packaging,shipment	62	Ass p man	1	sc e	Assembly line management: -
packaging,supply chain	31	Ass p man	1	sc e	Assembly line management: -
performance,ship	54	Ass p man	1	sc e	Assembly line management: -
performance,shipment	54	Ass p man	1	sc e	Assembly line management: -
performance,supply chain	39	Ass p man	1	sc e	Assembly line management: -
planning engine,supply chain	12	s p	1	sc p	Enterprise and site planning: -
rfid,supply chain	14	log man	1	sc e	Logistic operation management: -
rfid,tracking system	29	log man	1	sc e	Logistic operation management: -
rfid,vehicle	17	log man	1	sc e	Logistic operation management: -
schedule,supply chain	3	Ass p man	1	sc e	Assembly line management: -
schedule,warehouse	5	Ass p man	1	sc e	Assembly line management: -
ship,shipment	0	Ass p man	1	sc e	Assembly line management: -
ship,supply chain	94	Ass p man	1	sc e	Assembly line management: -
shipment,supply chain	94	Ass p man	1	sc e	Assembly line management: -
transportation,vehicle	167	Tr Man	1	sc e	Fleet management: -

ANNEXURE K

Value of each function over 25 documnt of SCP

	Patent Documents	SP	TP	OP	Manual Reading	Status
Fun 1	1.xml.txt	1.294438	0.901944	0.651944	sp	wrong
Fun 2	1.xml.txt	0.565015	0.413782	0.263782	irrelevent	correct
Fun 3	1.xml.txt	0.3	0.2	0.1	sp	wrong
Fun 1	10.xml.txt	1.621056	0.258127	0.008127	sp	correct
Fun 2	10.xml.txt	0.92777	0.04175	0	sp	correct
Fun 3	10.xml.txt	0.8	0.5	0	sp	correct
Fun 1	11.xml.txt	2.411038	0.724538	0.474538	sp	correct
Fun 2	11.xml.txt	1.271494	0.211066	0.061066	sp	correct
Fun 3	11.xml.txt	0.8	0.4	0	sp	correct
Fun 1	12.xml.txt	1.957456	1.795822	1.545822	sp	wrong
Fun 2	12.xml.txt	0.33457	0.442921	0.18457	irrelevent	correct
Fun 3	12.xml.txt	1.3	0.7	0.6	sp	wrong
Fun 1	1287.xml.txt	2.424323	2.51222	2.174323	sp	wrong
Fun 2	1287.xml.txt	1.257587	1.221269	1.071269	sp	wrong
Fun 3	1287.xml.txt	0.5	0.3	0.2	sp	wrong
Fun 1	1293.xml.txt	0	0.005506	0	tp	correct
Fun 2	1293.xml.txt	0	1.78E-05	0	tp	correct
Fun 3	1293.xml.txt	0.2	0.1	0	sp	wrong
Fun 1	13.xml.txt	0.536467	0.39244	0.14244	irrelevent	correct
Fun 2	13.xml.txt	0.139252	0.073112	0	irrelevent	correct
Fun 3	13.xml.txt	6.9	1.9	14.6	op	wrong
Fun 1	14.xml.txt	0.166765	1.514856	-0.083235	tp	correct
Fun 2	14.xml.txt	0.628225	0.015	0	sp	wrong
Fun 3	14.xml.txt	0.4	0.6	0.2	tp	correct
Fun 1	15.xml.txt	1.50442	1.204087	0.954087	sp	correct
Fun 2	15.xml.txt	0.555915	0.563785	0.405915	tp	wrong
Fun 3	15.xml.txt	0.8	0.5	0.2	sp	correct
Fun 1	16.xml.txt	0.428549	0.948108	1.2287	op	correct
Fun 2	16.xml.txt	0.160816	0.403741	0.5098	op	correct
Fun 3	16.xml.txt	0.15	0.3	0.5	op	correct
Fun 1	18.xml.txt	0.656011	0.260597	0	sp	correct
Fun 2	18.xml.txt	0.643186	0.53398	0	sp	correct
Fun 3	18.xml.txt	3.1	2.5	0	sp	correct
Fun 1	19.xml.txt	0.808724	2.514805	0.558724	tp	correct
Fun 2	19.xml.txt	0.640076	0.95375	0.490076	tp	correct
Fun 3	19.xml.txt	0.7	0.7	0.2	sp/tp	classify
Fun 1	19-8.xml.txt	1.755877	0.914551	0.664551	sp	correct
Fun 2	19-8.xml.txt	0.900421	0.269117	0.119117	sp	correct
Fun 3	19-8.xml.txt	0.6	0.35	0.3	sp	correct
Fun 1	2.xml.txt	1.970061	0.567839	0.317839	sp	correct
Fun 2	2.xml.txt	1.02317	0.125294	0	sp	correct
Fun 3	2.xml.txt	1.7	0.2	0.3	sp	correct
Fun 1	3.xml.txt	1.34241	0.712798	1.587	op	correct
Fun 2	3.xml.txt	0.182716	0.300372	0.2576	tp	wrong
Fun 3	3.xml.txt	0.1	0.1	0	sp/tp	wrong
Fun 1	4.xml.txt	1.647881	0.359375	0.2541	tp	correct
Fun 2	4.xml.txt	0.949179	0.063572	0.5564	sp	wrong
Fun 3	4.xml.txt	3.1	0.2	0.6	sp	wrong

	Patent Documents	SP	TP	OP	Manual Reading	Status
Fun 1	5.xml.txt	2.346531	0.641733	0.4567	sp	correct
Fun 2	5.xml.txt	1.493742	0.134683	0.0234	sp	correct
Fun 3	5.xml.txt	2.1	0.3	0.9	sp	correct
Fun 1	6.xml.txt	3.577963	0.655524	0.45567	sp	correct
Fun 2	6.xml.txt	2.032603	0.159799	0.2345	sp	correct
Fun 3	6.xml.txt	0.94105	0.17	0.08	sp	correct
Fun 1	7.xml.txt	2.20796	0.613392	0.1575	sp	wrong
Fun 2	7.xml.txt	0.452413	0.133654	0	irr	correct
Fun 3	7.xml.txt	3	0	0.5	sp	wrong
Fun 1	7-14.xml.txt	1.647881	0.359375	1.15	sp	wrong
Fun 2	7-14.xml.txt	0.949179	1.063572	0.0987	tp	correct
Fun 3	7.14.xml.txt	3	0.2	0.6	sp	wrong
Fun 1	7-21.xml.txt	1.34241	0.712798	0.325	sp	wrong
Fun 2	7-21.xml.txt	0.882716	0.300372	0.452	sp	wrong
Fun 3	7.21.xml.txt	1	0.1	0	sp	wrong
Fun 1	7-22.xml.txt	1.970061	2.567839	1.254	tp	correct
Fun 2	7-22.xml.txt	1.22317	1.125294	0.5673	sp	wrong
Fun 3	7.22.xml.txt	0.8	0.2	0.3	sp	wrong
Fun 1	8.xml.txt	1.487447	0.727884	1.645	op	correct
Fun 2	8.xml.txt	0.627025	0.288025	0.8275	op	correct
Fun 3	8.xml.txt	0.5	0.6	0.3	sp	wrong
Fun 1	9.xml.txt	1.482825	0.440131	0.325	sp	wrong
Fun 2	9.xml.txt	1.532815	0.154605		sp	wrong
Fun 3	9.xml.txt	1.1	0.4	0.6	sp	wrong